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COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

January 22, 1993

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OFF. OF ENVIRONMENTAL
QUALITY CONTROL

Mr. Brian J. J. Choy, Director
Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

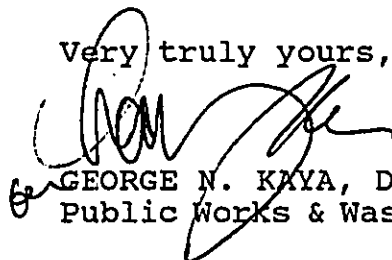
SUBJECT: NEGATIVE DECLARATION FOR THE MOLOKAI INTEGRATED
SOLID WASTE FACILITY, TMK: (2) 5-2-011:027 PORTION,
AT NAIWA, MOLOKAI, HAWAII

The Department of Public Works and Waste Management has reviewed the comments received during the 30-day public comment period which began on OEQC Bulletin Publication December 23, 1992. The agency has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the February 8, 1993 OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA.

Please contact Mr. Andrew Hirose of my Solid Waste Division at 243-7875 if you have any questions.

Very truly yours,


GEORGE N. KAYA, DIRECTOR
Public Works & Waste Management

AH:ah

Enclosures



1993-02-08-MO-*FEA-Molokai Integrated Solid Waste Facility*

FEB 8 1993

FINAL ENVIRONMENTAL ASSESSMENT
CHAPTER 343, HAWAII REVISED STATUTES (HRS)

FOR

MOLOKAI INTEGRATED SOLID
WASTE MANAGEMENT FACILITY

PREPARED FOR THE

COUNTY OF MAUI

DEPARTMENT OF PUBLIC WORKS
SOLID WASTE DIVISION

NAIWA, MOLOKAI, HAWAII

PREPARED BY

PARAMETRIX, INC.

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- 2 Project Site Plan
- 3 Soil Conservation Service Map of ISWF

LIST OF EXHIBITS

EXHIBIT

- A. Botanical Survey, Moloka'i Sanitary Landfill
 Char & Associates, December, 1990
- B. Field Survey of the Avifauna and Feral Mammals for a Proposed New
 Landfill at Naiwa, Moloka'i
 Dr. Phillip L. Bruner, January, 1991
- C. Archaeological Field Reconnaissance
 A. Sinoto Consulting, October, 1992

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Consultants in Engineering and Environmental Sciences



Andy Hirose
Solid Waste Engineer
County of Maui, Solid Waste Division
200 South High Street
Wailuku, Maui, Hawaii 96793

December 2, 1992
55-1988-04

Subject: Molokai ISWF Landfill Design

The purpose of this letter is to provide the County with a summary of the Molokai Integrated Solid Waste Facility (ISWF) Preliminary Design Report's (PDR) justification for the selected landfill design, expansion on some of the key issues and assumptions supporting that design, and presentation of other possible landfill designs and their associated incremental costs.

It is Parametrix' intent to provide the County with an integrated solid waste facility that provides Molokai with a centralized recycling and compost center and landfiling capability. This facility will be designed to meet both the regulatory requirements of RCRA Subtitle D and sound engineering practice.

Small Landfill Exemption

It has been the strategy of this project to utilize the Subtitle D *small landfill exemption* which allows landfill construction without a standard solid waste bottom liner or environmental monitoring. The Subtitle D criteria that must be met before an exemption may be granted are as follows:

1. The landfill must accept less than 20 tons per day of municipal solid waste, based on the annual average; and,
2. Experience at least three consecutive months of interrupted surface transportation to a regional waste management facility; or,
3. Have no practicable waste management alternative and receive less than 25 inches of annual rainfall.

In addition to these criteria, there must be no evidence of groundwater contamination for existing landfill expansions to use this exemption. Since this is a new facility, the discussion in the *Sound Engineering Practices* section of this report will be used to defend our position.



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County of Maui, Solid Waste Division
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Criterion 1 - 20 Tons Per Day Landfill Disposal


The first criterion is a function of the island's waste stream and waste reduction, recycling, and composting programs. The existing Kalamuala Landfill is receiving between 20 and 25 tons of refuse per day. To maintain 20 tons per day of disposed refuse, a recycling and composting capability is included as part of the facility. Based on data from the *Draft Waste Stream Analysis for the Island of Molokai*, (Parametrix 1992), the recycling and composting facility will need to recover approximately 27 percent of the waste generated on Molokai in 1993. This recovery rate increases steadily to 52 percent of the waste generated in 2013. These percentages are based on the assumed waste generated by the island using the *County of Kauai Waste Generation Study* (R.W. Beck 1990) as a model. Actual wastes received by the facility may be less, especially if waste reduction programs are implemented as outlined in the PDR and *County of Maui Draft Integrated Solid Waste Management Plan*, Parametrix 1992.

Recycling and composting will first be directed at those wastes which:

- can be most easily targeted and recovered,
- can meet the recovery goals of maintaining 20 tons per day of disposed refuse,
- can be marketed on Molokai or, if not, within the Hawaiian Islands.

Molokai has an advantage in that approximately 30% of its waste stream is green waste and the County and State generates most of it. By banning green waste from entering the landfill and by having County and State maintenance crews either dispose green waste directly into the compost facility or mulch the waste at its source, the facility can readily meet its initial landfill disposal goals. As more recovery is required, items such as paper (15% of the total waste stream), cardboard (10%), metal (10%), and glass (5%) can be targeted. These materials, as with mulched or composted green waste, can be marketed either on Molokai, Maui, or Oahu as a reused, recycled, or processed material. Because the disposal goals can be met by banning green waste from the landfill, a phased development of the recycling and composting facility may be appropriate.

As recovery becomes more difficult, island programs will need to be more carefully enforced and the landfill wastestream monitored. At first, waste loads, other than green waste, may



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Solid Waste Engineer
County of Maui, Solid Waste Division
December 2, 1992
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enter the landfill directly for disposal. This is possible if a green waste disposal ban at the landfill is enforced to meet the initial demand for waste reduction at the facility. As recovery of other waste types becomes more important, the scale attendant may be required to direct waste loads onto the refuse drop-off area for segregation of recyclables and compostables. The extent of this measure depends on the success of the waste reduction and recycling/composting programs outside the landfill and the suspected amount of recoverable materials in the individual loads. Who actually separates the waste is up to the County. Waste separation at the refuse drop-off area may also include disallowed wastes such as hazardous or toxic wastes. The drop-off area may also be used as part of the composting facility for receiving composting and mulching material.


Criterion 2 - Interrupted Transportation To A Regional Facility

Because only one of the final two criteria must be met to be eligible for the small landfill exemption, this criterion was not pursued.

Criterion 3 - No Other Practical Alternative Exists

The second criterion which can be met by Molokai is criterion three which says that no practical alternative is available and the site receives less than 25 inches of annual rainfall. The only other alternative to waste disposal on Molokai is to barge it to Maui for disposal. For planning purposes, the State recommended using a barging fee of \$120 per ton. Assuming 20 tons per day, the barging cost in 1993 is estimated at \$73,000 per month. This figure does not include transportation to the Central Maui Landfill or dock transfer station construction and operation/maintenance. By 2013, the monthly cost for barging, in 1992 dollars, is estimated at \$153,600.

Barging waste is usually an expensive transportation alternative. However, other points must be considered in eliminating this option. First, refuse on the Hawaiian Islands is typically collected twice per week because of the high degradation potential of waste in this tropical zone. Second, refuse storage time between barge trips could last a number of weeks depending on weather, transportation, and other factors outside of the County's control. In addition, there is no large regular ferry service. Third, devastating storms that cause extensive damage do occur in the Hawaiian Islands. Transporting solid waste off the island may be prolonged by more urgent needs, thereby delaying its removal from the population. Thus, relying on barging for transportation where waste decomposes rapidly, transportation


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delays are possible, and no other approved landfill facility exists could lead to unsanitary conditions and pose a threat to public health. Finally, the ISWF site receives an annual average rainfall of only 13 inches.

Sound Engineering Practice

By meeting the above small landfill exemption criteria, the County may construct and operate a solid waste landfill without meeting the RCRA Subtitle D bottom liner and environmental monitoring requirements, thereby reducing project capital outlay and complying with federal RCRA standards. However, the County must also remain environmentally conscious and exercise sound engineering practices. Parametrix performed a water balance analysis to estimate runoff, leachate production, and evapotranspiration from the landfill as it is constructed. The analysis employed the U.S. Environmental Protection Agency's computer model *Hydrologic Evaluation of Landfill Performance - Version 2 (HELP2)*. The HELP2 model was released by the U.S. Army Corps of Engineers' Waterway Experiment Station in 1984 and was updated in 1988. This model, recognized as a reliable model for estimating landfill performance within the engineering community, is used in all Parametrix landfill designs.

Leachate Generation

The HELP2 model was used primarily to estimate the leachate generated from a given cell over the life of a five-year phase development. The model utilized recorded climatological data including daily precipitation (1986-1990) and average monthly solar radiation, evaporation, and temperature (Honolulu). The model also considers vegetative cover leaf area indices and design criteria including the various landfill layers and their associated thicknesses, porosities, field capacities, wilting points, and hydraulic conductivities. For the ISWF analysis, conservative parameters were selected for the following cross section: six inches daily cover, 10 feet of refuse, 12 inches bottom soil layer. The parameter values used in the analysis are found in the PDR Appendix B - HELP2 Modeling Data. The model results estimated that a single cell would produce 49 cubic feet of leachate the first year, 50 cubic feet the second year, 70 cubic feet the third year, 360 cubic feet the fourth year, and 2420 cubic feet the fifth year. As a comparison, the fifth year's leachate production is less than five percent of the associated rainfall, or 0.67 inches, whereas many landfill covers in Washington State, with its higher rainfall, produce more than five percent leachate.



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Solid Waste Engineer
County of Maui, Solid Waste Division
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The 0.67 inches of leachate would be the entire depth of liquid, produced by the one acre cell over the entire year, which penetrates the landfill and enters the underlying geologic matrix beneath the bottom 12-inch soil layer. Based on these leachate generation rates and the fact that the brackish groundwater is over 200 feet below the bottom grades of the landfill, the potential for groundwater contamination from this facility is minimal. In addition, the facility is located within an underground injection control area.

As a comparison, consider that an average family of four produces about 20 cubic feet of waste water per day. Since most of the sewer systems on the island are septic drainfields, this waste water discharges into the ground. The worst-case scenario for leachate generation from Phase 1 is when about three acres (three cell areas) may be exposed at one time without intermediate or final cover. With this situation, which will probably last about one year, the expected leachate generation would be approximately 210 cubic feet per year or less than two weeks of an average family's drainfield discharge, see attached calculations. Though the leachate constituents will be different, the comparison is important when considering quantity and potential for groundwater contamination by a wastewater.

Infiltration Concept Discussion

Liquid transport through the waste is a complicated process involving both saturated and unsaturated subsurface flow. The model divides the landfill cross section into a number of sublayers and analyses them separately, allowing for influences from the overlying and underlying layers in terms of moisture input from above and moisture barrier from below. Modelling the top layer also includes runoff (SCS method) and evapotranspiration. The model assumes water flow throughout the landfill is governed by Darcy's Law. Infiltration through partial saturated layers is adjusted by reducing the flow rate according to the initial moisture content and then gradually increasing the rate as the layer becomes saturated enough to meet the Darcy's Law assumptions for saturated flow. When the model analyzes a barrier layer, it calculates the head build-up over the layer, leakage through the layer, and the lateral subsurface drainage across the layer.

To visualize the analysis, consider the landfill as a series of sponges of varying moisture, thickness, and storage capacity. Rain falls onto the top sponge and either runs off, evaporates, or infiltrates below the evapotranspiration zone. In the case of the ISWF, the cell has only daily cover, so only evaporation was considered. Infiltrated moisture slowly penetrates the different sponges as each sponge's moisture content is brought up to capacity


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and water flow can overcome the tendency to be stored. As a general rule, higher-permeable layers require less partial saturation before the moisture can move down to the next layer. By providing a well-compacted cell lift, water is more likely to run off, be detained within the evaporation zone and evaporate, or be stored within the layers and attenuate the flow of leachate out of the cell.

Progress through the different layers is a function of each layers' ability to retard or hold moisture and the climatologic conditions. One condition which can have a major effect is the rain pattern. The PDR analyzed the site under two different rainfall patterns with the same average annual rainfall. The PDR's HELP2 model utilized a rain gage near the Molokai ISWF, situated between the island's two volcano ranges, and the Olowalu Landfill, situated on the west slope of a volcano on Maui. The analysis showed that the Molokai gage experienced a few storms per year with high rainfall and the Olowalu gage experienced many small storms with low rainfall. The Molokai gage HELP2 model results produced a smaller leachate generation rate than did the Olowalu gage results. This variation is probably the result of moisture on Molokai tending to pond on top of the cell, because of its few high intensity storm pattern, and either running off or evaporating before it can infiltrate; whereas, a pattern with many low intensity storms, as found at Olowalu, keeps the moisture content replenished until it can infiltrate below the evaporation zone. As a result, if we compare the ISWF site to the Olowalu landfill, the ISWF offers better siting and leachate production characteristics. This point is especially important when considering that the Olowalu landfill's groundwater monitoring results showed no evidence of contamination from the landfill.

Parametrix believes that the Molokai ISWF remains a good candidate for Subtitle D's small landfill exemption. The facility has the unique characteristics of a high compostable and recyclable waste stream, island size and location, economic considerations, and environmental conditions to be a practical facility for the responsible handling of the island's solid waste.

Additional Design Features

If additional design features are considered for the ISWF landfill, there will be an associated cost and benefit that the County must appraise. Parametrix has provided the two following added features for the County's consideration:

- Option One - two feet of 1×10^{-5} cm/sec permeability clay bottom liner;

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- Option Two - Subtitle D bottom liner consisting of a two foot drainage layer, 60-mil High Density Polyethylene geomembrane, and a two foot 1×10^{-7} cm/sec permeability clay layer.

Option One

Option One would increase the cost of constructing Phase 1 by \$200,000 (1992 dollars) and the entire landfill by \$650,000. The benefit of this bottom liner would be a slight attenuation of the leachate through the liner and possibly some absorption and adsorption of leachate constituents within the liner.

Option Two

Option Two would increase the cost of constructing Phase 1 by \$625,000 and the entire landfill to \$2,000,000. The benefit of this bottom layer is that no leachate would leave the landfill. However, the collected leachate would still need to be handled by pre-treating and discharging it into a surface water, recycling collected leachate back onto the landfill, or injecting it into the ground, which leads us back to the current leachate handling proposal.

Final Closure

An important point to consider is the Subtitle D closure requirements which state:

Subpart F 258.60 Closure Criteria.

a) Owners or operators of all MSWLF units must install a final cover system that is designed to minimize infiltration and erosion. The final cover system must be comprised of an erosion layer underlain by an infiltration layer as follows:

(1) The infiltration layer (barrier layer) must be comprised of a minimum of 18 inches of earthen material that has a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.

Because the ISWF will not be exempt from the Subtitle D closure requirements, the final



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Solid Waste Engineer
County of Maui, Solid Waste Division
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cover must be at least as protective as the bottom liner. If no bottom liner or a minimal bottom liner is allowed, then an eighteen inch 1×10^{-6} cm/sec soil layer would be the minimum required cover layer. However, the County must also consider sound engineering practice and environmental protection.

Because the active landfill cells remaining 95% efficient after five years (i.e. they allow only 5% of the rainfall moisture through the landfill before closure) a landfill cover which promotes evapotranspiration and runoff should increase this efficiency to near that of a cover system with a geomembrane. Consequently, a minimum Subtitle D cover is all that will probably be needed. Final determination will be made during the final ISWF design.

Though these optional design features provide some additional protection, they appear not to justify the additional cost for bottom liner, final cover, and leachate collection and handling systems - systems which will most likely handle very little leachate.

ISWF Entrance Road

As a final note, Parametrix is working with Molokai Ranch and the State DOT in presenting a submittal for the modified entrance road to the ISWF. We are currently in contact with the State to discuss the format of the permit submittal. I will FAX you a drawing, before we get too far into the report, for your approval of the concept.

If you have any questions regarding this letter of the Preliminary Design Report, please feel free to contact me or Dwight Miller at (206) 822-8880.

Sincerely,

PARAMETRIX, INC.

Tom Bourque
Tom Bourque, P.E.
Project Engineer

cc Ramon Beluche, Parametrix
Fred Rodriguez, Parametrix

Parametrix, Inc.

PROJECT MOLOKAI ISWF

BY TB

DATE 12/2/92

CHECKED

DATE

JOB NO 55-1989-04

SHEET 1 OF 2

DETERMINATION OF LEACHATE PRODUCTION DURING PHASE CONSTRUCTION

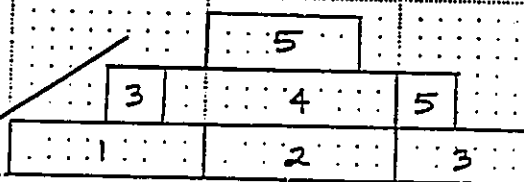
DURING THE FOURTH AND FIFTH YEARS OF PHASE ONE, THREE ACRES OF PLACED REFUSE WILL BE EXPOSED. THIS IS CONSERVATIVE SINCE SOME INTERMEDIATE OR FINAL COVER WILL BE PLACED WHICH WILL DECREASE LEACHATE GENERATION BELOW THIS ANALYSIS ASSUMED RATES.

LEACHATE GENERATION FOR ONE CELL OVER FIVE YEARS

	YEAR 1	2	3	4	5
LEACHATE	49	50	70	360	2420
CUBIC FEET					

OVERALL LEACHATE GENERATION IS A FUNCTION OF RAINFALL INPUT, CELL CONSTRUCTION, AND EXPOSED AREA. BELOW FIND THE ANNUAL CELL CONSTRUCTION SEQUENCE (EACH CELL ONE ACRE).

FINAL COVER
AFTER THIRD
YEAR



FOLLOWING IS THE PHASE'S LEACHATE GENERATION RATE (CELLS 1-5) BASED ON THIS PHASE CONSTRUCTION AND THE ASSUMPTION THAT ONCE A CELL IS CUT-OFF FROM RAINFALL BY ANOTHER CELL PLACED ON IT - IT WILL CONTINUE TO PRODUCE LEACHATE AT ITS HIGHEST RATE UNTIL THE PHASE IS CLOSED (CONSERVATIVE CELL'S EXPOSED SIDESLOPES WILL BE CLOSED AFTER THE THIRD YEAR).

YEAR	1	2	3	4	5	TOTAL CF/YEAR
1	49 CF/YR	-	-	-	-	49
2	50	49	-	-	-	99
3	70	50	49	-	-	169
4	70	70	50	-	-	190
5	70	70	70	-	-	210
TOTAL	309	239	169	0	0	717 CF/5 YR

WORST YEAR

Parametrix, Inc.

PROJECT Molokai ISUE JOB NO.
 BY DATE CHECKED DATE SHEET 2 OF 2

IF FINAL COVER IS NOT PLACED OVER CELL 1'S
 SLOPES WHICH ARE AT FINAL GRADE, CELL 1
 WILL PRODUCE:

YEAR 4 - 360 CF

YEAR 5 - 2420 CF

WORST CASE - YEAR 5 CELLS 1, 2, 3 ADDED

$$2420 + 70 + 70 = 2,560 \text{ CF/YR}$$

WHEN COMPARED TO AN AVERAGE FAMILY'S
 WASTEWATER PRODUCTION OF 20 CF/DAY, THIS
 EQUALS:

$$\frac{2,560 \text{ CF}}{20 \text{ CF/DAY}} = 128 \text{ DAYS OR ABOUT}$$

4 MONTHS OF FAMILY
 WASTEWATER DISPOSAL
 PER ONE YEAR LANDFILL
 LETCHATE GENERATION

ANOTHER COMPARISON IS THAT THE LANDFILL
 PRODUCES, IN YEARS 5, LESS WASTEWATER THAN
 THAT OF TWO AVERAGE PEOPLE.

I. SUMMARY

CHAPTER 343, HRS ENVIRONMENTAL ASSESSMENT (EA)

Action: Agency (Document is being prepared pursuant to the application for a County Special Use Permit (SUP))

Project Name: Integrated Solid Waste Facility (ISWF)

Project Description: The proposed project is to develop a Solid Waste Management Facility that is an integrated program of: traditional landfill operations; a recycling component for metals, glass, plastic, paper products, and household hazardous waste; and composting and mulching of organic materials.

Project Location: Naiwa, Western Molokai (See Figure 1)

Tax Map Key: Second Division (County of Maui) 5-2-11: 27

Area: 40 acres*

State Land Use Designation: Agriculture

County Zoning Designation: Agriculture

Community Plan Designation: Agriculture

Landowner: County of Maui.

Agent: Parametrix, Inc.

Contact: F. J. Rodriguez
Parametrix, Inc.
1164 Bishop Street, Suite 1600
Honolulu, HI 96813
Tel. (808) 524-0594

*References made in the technical studies attached to this document were prepared under previous site plans of larger acreage. Current Plan is for 40 acres as proposed.

II. PROJECT DESCRIPTION

A. Technical Characteristics

1. The Integrated Solid Waste Facility (ISWF) is currently in the design phase, and is being developed under two major regulatory standards governing solid waste facilities. These are the **Drainage Master Plan for the County of Maui** and the **EPA Criteria for Municipal Solid Waste Landfills, 40 CFR 258, Subtitle D**. It is the intent of this project to meet the "Small landfill" criteria in Subtitle D, allowing exemptions from Subparts D (design criteria) and E (Ground Water Monitoring and Corrective Action). To meet the "small landfill" criteria, the following must be met:
 - a. The landfill must receive less than 20 tons per day of municipal solid waste, based on the annual average; and
 - b. experience at least three consecutive months of interrupted surface transportation to a regional waste management facility; or
 - c. have no practicable waste management alternative and receive less than 25 inches of annual rainfall.
2. The following locational standards are also being complied with in the overall project design phase. They are based on available data, specific field exploration, and solid waste facility design experience.
 - a. Locational standards (Airports): The Facility must be located at least 10,000 feet from a turbojet airport and 5,000 feet from a piston only airport.
 - b. Floodplains: The Facility must not restrict the flow of a 100 year flood or reduce storage capacity within a floodplain.
 - c. The Facility must not be located within established wetlands.
 - d. The Facility must not be located within 200 feet of a Holocene Fault.
 - e. The Facility must not be located within a seismic impact zone.
 - f. The Facility must not be located within an Unstable area, unless appropriate engineering controls are implemented to mitigate the unstable conditions.
3. Surface Water Runoff Management
 - a. All roadways, culverts, bridges or other structures will be designed to a control

factor compliant with the standards for a tributary area less than 100 acres and for a storm event of 50 years, 24 hours. Design methodology - SCS Methods, TR-55 or TR-20.

b. Ditches and channels: 25 years, 24 hours.

c. Runoff and run-on control shall be as follows:

i. The surface water control system must be designed, constructed, and maintained to provide:

a) runoff control from the active portion of the landfill which collects and controls at least the water volume resulting from a 24 hour, 25 year storm event,

b) run-on control which prevents flow onto the active portion of the landfill during the peak discharge from a 24 hour, 25 year storm event.

ii. All surface runoff from the developed/closed landfill shall be routed through a sedimentation pond prior to discharge into existing water courses.

d. Drainage controls will be designed to meet the following:

i. Setbacks will meet the definition as that distance from the normal high water line of the drainage course to the nearest point of actual landfill development (clearing & grubbing).

4. The hydrogeologic Assessment utilizes available data i.e. published literature, site investigation, and topographic mapping. These are being used to evaluate the Site's current conditions and prepare design criteria to mitigate or eliminate future operational impacts. At the present time, the available data reveal the following:

a. The landfill area aquifer is identified as a wastewater recharge area, perhaps because the area's ground water tends to be brackish.

b. Perched ground water does exist on the island, but is usually found along the northern coast area.

c. The Site's soil conditions consist of 4-7 feet of Holomua silt loam, 10-15 andesite, up to 8 feet of ash, and 25-30 feet of basalt. The site's southeastern portion is covered with up to 24 inches of stony and rocky lands.

Based on the above conditions, the following assumptions will be used:

- Excavations will be into the topsoil layer, leaving at least one foot of soil above the andesite layer.
 - Daily, intermediate, and final cover soil requirements will be estimated in the Design Report. Landfill design will maximize the use of on-site soil sources.
 - Final cover soil must be less than or equal to 1×10^{-4} cm/sec permeability.
5. Site access and transportation requirements will be designed to meet applicable County and State construction and design standards.
 - a. Permanent entrance road will provide two twelve foot paved lanes with open channel drainage.
 - b. AASHTO design criteria will be used for horizontal and vertical alignment @ 30 miles per hour. Maximum grade will not exceed seven percent.
 - c. Surface treatment will be asphaltic concrete from Maunaloa Highway to the landfill access road and gravel pit intersection. From the intersection, the access road will be gravel. All temporary roadways will use on-site materials with gravel top course. Road widths will be to landfill equipment requirements.
 6. The landfill portion of the Site will be designed to provide the following refuse capacity requirements.
 - a. Capacity: 18,250 cubic yards (CY) per year, assuming 20 tons per day, 1000 pounds per CY and 25% daily cover. The landfill is to be developed in phases every five years, with a total 30 year capacity of 550,000 CY.
 - b. Cell and phase construction: each cell contains a total of 18,250 CY, or one year's worth of refuse and daily cover. Each phase shall last five years after which intermediate cover will be placed over the entire phase to insure gas, run-off, and vector control. After intermediate cover is placed, exterior portions of the phase will be permanently closed. The new phase will be contiguous to the old phase and utilize its interior sideslopes for cell construction. The 30 year landfill will be approximately 12 acres and 70 feet thick.
 - c. Bottom liner and leachate collection: Based on the small landfill exemption under Subtitle D and the fact that the landfill area is designated as an underground injection control area, the possibility of not utilizing a low permeable bottom liner is under review. Active landfill runoff and leachate generation has been modeled using the HELP model to determine the amount of water passing through the

landfill and the impact of having no low permeable bottom liner on the underlying subgrade. The bottom grades will be such that surface water or leachate will not exit from the active cell's footprint.

- d. Final Cover: The final cover system must meet Subtitle D closure criteria. As a result, the cover must consist of at least an eighteen inch thick infiltration layer with at most 1×10^{-5} cm/sec permeability and six inch erosion layer capable of sustaining vegetation and resisting erosion. An alternate cover system may be used if it can be shown to have at least the same permeabilities properties. Sideslopes shall not exceed 25% or be less than 5%.
 - e. Surface Water Management: Surface water control will be in accordance with the Drainage Master Plan for the County of Maui and Subtitle D. Analysis shall include both SCS TR-55 or TR-20 and the HELP model. The HELP model shall be used to determine the final cover's efficiency and interaction with the surface water collection system. Landfill development shall take advantage of the site topography to control runoff and run-on. Runoff from areas other than the active cells shall be controlled by interception ditches, channels, and sedimentation pond. Flat swales may be an appropriate substitute for the ponds if discharge flow quantities and velocities do not exceed standard engineering practices. Closed landfill portions shall not contribute run-on into active cells. Both runoff and run-on shall be controlled at all times. Control shall utilize berm diversions, ditches, and roadways.
 - f. Landfill gas management: Landfill gas and fire control are important considerations in the overall design strategy. Gas control may consist of barriers, operations, and installation of a gas extraction system. Basic criteria shall prohibit underground gas migration beyond the property boundary. Control systems shall employ perforated pipe trenches and/or vertical wells, and flare burnoff.
7. The ISWF also provides as part of the total solid waste management policy at Naiwa, a recycling drop-off facility. This function shall be part of the scale/office compound before the scale house at the landfill entrance. It will receive solid waste traditionally disposed of in a landfill, but which will now be collected for recycling. These will include selected glass, metals, paper, cardboard, and certain plastics. These materials will be placed by haulers into appropriate bins for further processing that may include glass separation, crushing, and placing into shipping containers; paper handling, baling, and/or mulching; metal compaction and baling; and plastic handling, shredding, and baling. A second function that will be included in the ISWF will be a Compost Facility. This function will be placed near the scale/office compound after the scale house. Using the windrow composting method, gravel or paved rows for the windrows will be worked by a loader. The layout shall consider equipment needs and be sized to receive approximately 2000 tons per year with the capacity to expand to

3500 tons per year. Water supply may be limited at the ISWF and daily water trucks or a storage tank are possible options.

8. The balance of the proposed improvements at the ISWF are the essential support services ancillary to a solid waste facility. These would be a scale house; employee facilities building for restrooms, locker room area, and lunchroom area; equipment maintenance building for the tractors, loaders, and road equipment; administrative office space; and parking area; general public disposal facility; and the above described compost and recycling facilities.

B. Social and Economic Characteristics

The Island of Molokai has historically been a segment of Maui County that has remained in the more traditional Hawaiian mode of rural community. An economy that is based on agriculture, the "Friendly Isle" has seen the decline of major agricultural operations in pineapple, with a shift to diversified crops cultivated by private farmers on leased land parcels. Hawaiian Homestead lands have been used in an increasing number, and the availability of agricultural water has been of great assistance. Molokai has succeeded in moving Maui County ahead of Hawaii County as a producer of vegetables and melons (First Hawaiian Bank, 1989). Population on the island has remained stable, with recent population estimates at 7677 for the year 1990. (DBED Library, 8/92). Estimated population through the year 2000 and 2010 are approximately 10000 and 12000 respectively.

C. Environmental Characteristics

The Project site is located on the Hoolehua Plain, the central isthmus that joins the East Molokai Volcano and West Molokai Volcano (See Figure 2). The site is on mildly sloping lands between the 280 and 220 topographic contours. The slope is from north to south at approximately six percent. North of the site approximately 0.3 miles away is the Manawainui Gulch and a smaller unnamed gulch borders the site to the east. The ambient temperature range is typical for Hawaii's climate, with a consistent east-northeast trade wind pattern, low humidity levels, and moderate variations that is due only to seasonal storm variations. Rainfall is low, with an annual rainfall at the project site of approximately 15 inches. The project site is located adjacent to an active rock and aggregate quarry operation, and is consistent with the adjacent uses. Fugitive dust from the quarry's crushing, batching, and hauling are temporary sources of airborne pollution to the landfill. Noise from the quarry operations is also an occasional disturbance, but the operational noise is generally maintained to the metes and bounds of the quarry lease area. In summary, the landfill site is surrounded by open range, and this typical open space character is typical of the Central Molokai isthmus. From Maunaloa Highway, the landfill site is not fully visible to the passing motorist, although a limited portion of the site can be seen from the highway. As it is sited, the landfill is not part of or does it overlook any scenic corridor or aesthetic view plane.

III. AFFECTED ENVIRONMENT

A. Geographical Characteristics

1. Topography: The project site is located on mildly sloping lands between the 280-ft and 220-ft topographic contours. The parcel is generally uniform and level in terrain, sloping in a north to south direction at approximately six (6) percent. The Manawainui Gulch is located approximately 0.3 miles to the north of the site and a smaller, unnamed drainage gulch borders the site to the east.

2. Soils: The Site is characterized by two distinct soil series. These are: *Holomua Silt Loam*, 3 to 7 percent slopes, severely eroded. (HvB3). and *Very stony land, eroded*, (rVT2) (See Figure 3).

"The Holomua series consists of well drained soils on uplands on the island of Molokai. These soils developed in volcanic ash and material weathered from andesite rock. They are nearly level to strongly sloping. The elevation ranges from 100 to 1000 feet, but in most places it is less than 500 feet. The annual rainfall amounts to 15 to 20 inches. Most of the rainfall comes in the form of storms, from November to April. The summers are hot and dry, with little or no rain. These soils are used for pineapple, pasture, truck crops, and wildlife habitat. The natural vegetation consists of kiawe, uhaloa, ilima, pili grass, and feather finger grass.

Very stony land, eroded consists of large areas of severely eroded soils on Molokai and Lanai. About 50 to 75 percent of the surface is covered with stone and boulders. There are common shallow gullies and a few deep gullies. The soil material is like that of the Holomua, Molokai, Pamoia, and Waikapu soils. In most places, it is less than 24 inches deep to bedrock, but it is deeper in a few low-lying areas. Slopes are mainly 7 to 30 percent. but they range from 3 to 40 percent. These areas are used for pasture and wildlife habitat. Improvements for pasture is difficult due to the many stones and gullies, and in many areas, the carrying capacity is very low. The habitat is excellent for axis deer, and with a little improvement, excellent habitat for game birds can be established." Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. United States Department of Agriculture, Soil Conservation Service, August, 1972.

The University of Hawaii Land Study Bureau Detailed Land Classification rates the subject parcel as "E43" and "E47". Both land types are generally used for grazing.

3. Vegetation: Char & Associates conducted a botanical survey on the subject parcel in December, 1990 and found the following: " There is very little of botanical interest on the project site as the vegetation is composed primarily of introduced plant species. No threatened or endangered plants were found or are known to occur on the site

(US. Fish & Wildlife Service, 1989, 1990). No sensitive native plant communities occur on the site. In summary, the proposed landfill and integrated improvements are not expected to have a significant negative impact on the botanical resources of the site as it is dominated by introduced plants. All of the species found on the site also occur in abundance or are common throughout the islands in similar environmental conditions." (See Exhibit A)

B. Hydrological Characteristics

1. **Drainage:** The project site is located on the Hoolehua Plain, the central isthmus joining the East Molokai Volcano and the West Molokai Volcano. Several drainage gulches cut across the isthmus, and the Manawainui Gulch is the most prominent. Located north of the project site, Manawainui Gulch would be the natural receptor for severe flooding or surface runoff in storms of 50-100 year event magnitude. The traditionally dry and arid conditions of the project site does not lend itself to local flooding conditions. Also, the site is located 1.6 miles from the coastline and well beyond the limits of coastal inundation as delineated by the Flood Insurance Rate maps.
2. **Coastal Zone Management Program:** The proposed project will not adversely impact the physical, natural, cultural, ecological, and recreational resources of coastal zone areas. The subject parcel is located well beyond the limits of the County's Special Management Area (SMA) and is not subject to the SMA review procedures of the Molokai Planning Commission.

C. Biological Characteristics

1. **Fauna:** A brief study of avifauna and feral mammals was conducted on the site in January, 1991 (See Exhibit B). In general, the study found that the subject parcel provides a limited range of habitats utilized by a typical range of exotic or introduced birds. No resident native birds were observed at the site, although migratory indigenous birds (Pacific Golden Plover and the Ruddy Turnstone) were observed. Mammals observed at the site included feral cats, dogs, rats, mice, mongoose, and Axis Deer. Most observed species were passing through foraging for food, and in general, utilizing the site to the limited extent possible.

IV. SUMMARY OF MAJOR IMPACTS AND MITIGATIVE MEASURES

The principal impacts that can be anticipated from the implementation of this project will be:

- A. During the construction phase, the short-term construction related impacts of Noise and generation of fugitive dust may exceed State standards. These can be mitigated by adherence to the County grading ordinances which require noise control muffling devices on heavy construction equipment, and the frequent watering of the subject parcel to abate fugitive dust. Also, the minimum acreage to be cleared and graded at one time must be complied with.
- B. In the event significant archaeological sites are uncovered during the construction phase, work will be halted at the specific location of the uncovered find and the State Historic Preservation Division office, State Department of Land and Natural Resources is to be notified immediately. After examination of the discovered finds and certification of the find's value, work at the specific location will be permitted to resume.
- C. Leachate migration and other landfill related impacts will need to be designed so as to prevent infiltration or percolation into the basal aquifer. The site is located in a zone of brackish basal water, and more specifically, the site is within the Manawainui Aquifer System of Molokai's Central Aquifer Sector. Mitigative measures will include the proposed integrated solid waste facility plan that will reduce the total daily tonnage placed in a landfill. This means the recycling of selected solid waste and composting/mulching of organic materials, will be implemented to reduce landfill volume to no greater than 20 tons/day. The open working face will be kept at a minimum, to reduce moisture infiltration.

V. ALTERNATIVES CONSIDERED

The review of alternatives to the Naiwa Landfill have progressed to the development of the Integrated Solid Waste Facility, which when completed, will incorporate the mitigative aspects of Solid Waste management, i.e. recycling, mulching and composting. This plan to reduce the solid waste stream into the landfill will extend the life expectancy of the landfill and also provide the Molokai Facility with a more environmentally aware view of solid waste management. The "Do-Nothing" alternative was not considered in view of the Kalamaula Landfill at capacity, with no expansion capability.

VI. DETERMINATION, FINDINGS, AND REASONS SUPPORTING DETERMINATION

After completing an assessment of the potential environmental effects of the proposed project, and consulting with other government agencies, it has been determined that an Environmental Impact Statement (EIS) is not required. Therefore, this document constitutes a Notice of anticipated Negative Declaration. At the conclusion of the 30 day review period as a Draft E.A., an official letter requested formal Negative Declaration status will be made by the County of Maui on the following criteria:

- A. The proposed project will not adversely affect the physical and social environment. There will be minor and temporary instances when the State's ambient air and noise standards may be exceeded during the construction phase, but these can be mitigated by the contractor's adherence to State Health Department standards for fugitive dust and ambient noise.
- B. There will be no disruption of businesses or residents by this proposed project. The site is presently vacant and undeveloped.
- C. There are no endangered plant or animal species present on the Site. Prevailing flora and fauna are exotic or introduced varieties.
- D. There are no known historic or archaeological sites on the subject parcel. A field reconnaissance and study were completed (See Exhibit C) and the State Historic Preservation Division, State Department of Land and Natural Resources have reviewed the subject study. There is "no effect" on significant historic sites.
- E. There are no significant adverse secondary impacts or effects on population, future development, and public facilities due to this project.

This anticipated Notice of Negative Declaration shall serve to meet the requirements of Section 11-200-11, Environmental Impact Statement Rules.

VII. FUNDING AND PHASING

Phasing: It shall be assumed that the ISWF will be developed in six phases of five years each.

Funding: An estimate of capital costs to develop and close the site will be prepared using recognized cost criteria. All costs shall be expressed in 1993 dollars. The ISWF will also evaluate the potential revenues from the recycling /composting operations. An economic analysis should be prepared as part of the facility development which discusses capital outlay costs, operation/maintenance costs, and markets for the collected materials.

VIII. AGENCIES TO BE CONSULTED IN PREPARATION OF E.A.

ORGANIZATIONS AND AGENCIES

<u>AGENCY</u>	<u>Date of Consultation</u>	<u>Date Comment Received</u>
<u>Federal</u>		
U.S. Army Corps of Engineers	Oct. 23, 1992	Nov. 3, 1992
US. Department of Interior Fish & Wildlife Service		
US. Department of Agriculture Soil Conservation Service		
<u>State of Hawaii</u>		
Department of Land and Natural Resources Historic Sites Division Division of Forestry and Wildlife Division of Water Resource Management Office of Conservation Affairs	Oct. 23, 1992	Nov. 30, 1992
Department of Transportation Highways Division	Oct. 23, 1992	Nov. 2, 1992
Department of Health Environmental Management Division	Oct. 23, 1992	Nov. 30, 1992
Department of Agriculture Planning Office	Oct. 23, 1992	Dec. 1, 1992
Department of Hawaiian Home Lands	Oct. 23, 1992	Nov. 6, 1992
Department of Business, Economic Development & Tourism Land Use Commission Energy Division Office of State Planning	Oct. 23, 1992	Nov. 24, 1992
University of Hawaii, Environmental Center		
<u>County of Maui</u>		
Planning Department	Oct. 7, 1992	Oct. 16, 1992
Economic Development Agency		
Department of Public Works		
<i>Molokai Integrated Solid Waste Management Facility</i>	<i>13</i>	<i>January 21, 1993</i>

ORGANIZATIONS AND AGENCIES

<u>AGENCY</u>	<u>Date of Consultation</u>	<u>Date Comment Received</u>
Department of Water Supply		
Department of Public Works Waste Water Reclamation Division	Oct. 23, 1992	Nov. 16, 1992
<u>Other</u> Molokai Planning Commission		
Molokai Ranch, Limited		

*Molokai Integrated Solid
Waste Management Facility*

14

November 20, 1992



DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

1164 Bishop Street, Suite 1800
Honolulu, Hawaii 96813

92-1265C

November 24, 1992

Mr. F.J. Rodriguez
Parametrix, Inc.
1164 Bishop Street, Suite 1800
Honolulu, Hawaii 96813

Dear Mr. Rodriguez:

Thank you for the opportunity to review the Preliminary Environmental Assessment (PEA) for the proposed Solid Waste/Sanitary Landfill Facility at Naiva, Molokai. Our primary focus is on recycling and composting, and the potential for energy from biomass, as these activities reuse valuable resources or produce energy.

We are aware that attempts have been made to establish a recycling industry on Molokai. Formalizing the collection of recyclables at the proposed landfill site should increase the feasibility of creating a viable recycling business on Molokai.

The assessment projects that over 10% of the material entering landfill will be converted to compost. Creating compost will reap numerous benefits: a) the landfill life will be extended, b) employment will be generated by the processing and distribution of the compost, c) Molokai businesses and individuals will spend less money on importing soil amendment. However, the PEA does not address the cost of composting, the market for the compost, or the alternative of using dry biomass in the biomass electric generator. The value of dry biomass as fuel vs. compost should be weighed.

Finally, the PEA should refer to coordination with the State Integrated Solid Waste Management Plan and/or the Maui County Solid Waste Management Plan (currently under development.)

In summary, we feel that recycling and composting are excellent features of the proposed landfill. However, other biomass options should be examined. State and County plans should be referenced. Thank you again for the opportunity to comment.

Sincerely,

Maurice H. Kaya
Maurice H. Kaya
Energy Program Administrator

HHK:dk1k

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JOHN WARE
Governor
MATT HANSEN
Deputy Governor
BARBARA BELL BLANCHARD
Deputy Director
JOHN EGAN
Deputy Director
TAMARA YOSHIMURA
Deputy Director

PARAMETRIX, INC.
HONOLULU

1164 BISHOP STREET, SUITE 1800, HONOLULU, HAWAII 96813 PHONE: (808) 547-3400 FAX: (808) 547-3420

LINDA CROCKETT LINGLE
Mayor
GEORGE H. KAYA
Deputy Mayor
CHARLES JENCKS
Deputy Mayor
LLOYD P. W. LEE, P.E.
Chief Staff Engineer



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

December 2, 1992

Mr. Maurice H. Kaya
Department of Business, Economic Development
& Tourism - Energy Division
335 Merchant Street, Room 110
Honolulu, HI 96813

Dear Mr. Kaya,

We are in receipt of your office comments dated November 30, 1992 on the pre-draft Environmental Assessment for the Integrated Solid Waste Facility at Naiva, Molokai. We respond to your comments as follows:

As you have indicated, projects on recycling are being attempted on Molokai. Also, efforts are being made to organize composting projects. We will continue to move forward in this direction and feel that the ISWF on Molokai will be an excellent step. Thank you for your continuing interest and cooperation.

Yours very truly,

David F. Wissmar
David F. Wissmar, Chief
Solid Waste Division

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PARAMETRIX, INC.
HONOLULU

ALAN SHIMMOTO
Land Use and Code Administrator
EASIE MITLER, P.E.
Watershed Reclamation Design
RALPH NAGAMINE, P.E.
Engineering Division
BRIAN NASHIRO, P.E.
Solid Waste Division
MELVIN HIPOLITO
Highways Division

LINDA CROCKETT LINGLE
Deputy
GEORGE N. MAYA
Director
CHARLES JENCKS
Deputy Director
AARON SHIMADATO, P.E.
Chief Staff Engineer



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH WAGGONER, L.E., P.E.
Land Use and Code Administration
EASIE MILLER, P.E.
Waste and Recycling Division
LLOYD PCW LEE, P.E.
Engineering Division
DAVID WISSMAR, P.E.
Solid Waste Division
BRIAN HOSHINO, P.E.
Highways Division

December 2, 1992

Mr. Yukio Kitagawa, Chair
Board of Agriculture
1426 South King Street
Honolulu, Hawaii 96814-2512

Dear Chair Kitagawa:

We are in receipt of your department comments dated November 25, 1992 on the pre-draft agency review Environmental Assessment for the Na'aua Integrated Solid Waste Management Facility. Please be advised that it is the intent of the Department of Public Works to seek a Negative Declaration for the proposed project. This is in anticipation of no "Significant Impacts" due to the proposed projects implementation.

In response to your inquiry as to the adjacent land uses, the project site is presently vacant and fallow, and is located next to an active rock quarry operation. There will be a briefing before the Molokai Planning Commission on December 16, 1992 at the Mitchell Pauole Hall in Kaunakakai at 1:30 p.m. Your office's input at that presentation would be most welcome and valuable.

Thank you for your continuing interest and cooperation.

Very truly yours,

David F. Wissmar
DAVID F. WISSMAR
Solid Waste Division Chief

DFW:jip

JOHN WARREN
Governor



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512
November 25, 1992

DEC 01 1992

YUKIO KITAGAWA
Chairperson, Board of Agriculture
KIMA A. PEANAJA
Deputy to the Chairperson

FAX: 973-9413
Mailing Address:
P.O. Box 22159
Honolulu, Hawaii 96823-2159

Mr. P. J. Rodriguez
Parametrix, Inc.
1164 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

Dear Mr. Rodriguez

Subject: Draft Environmental Assessment (EA)
for Molokai Integrated Solid Waste
Facility (ISWF) Na'aua, Molokai,
THK: 5-2-11:27, Area: 40 acres

The Department of Agriculture (DOA) has reviewed the subject Draft EA and offers the following comments.

According to the Draft EA the Maui Department of Public Works will construct a Solid Waste/Sanitary Landfill Management Facility. The facility comprises an integrated program of: traditional landfill operations; a recycling component; household hazardous waste management program; and composting and mulching for organic materials.

The subject area is located west of Maunaloa Highway and approximately three miles northwest of Kaunakakai. The proposed facility will be about 40 acres in size.

It will be helpful if the Draft Environmental Impact Statement includes a description of the existing land uses, if any, in the proposed site and the surrounding lands in the vicinity.

Thank you for the opportunity to comment.

Sincerely,

Yukio Kitagawa
YUKIO KITAGAWA
Chairperson, Board of Agriculture

cc: Maui County, Department of Public Works
Office of Environmental Quality



LINDA CROCKETT LINGLE
Mayor
GEORGE N. KAYA
Director
CHARLES JENCKS
Deputy Director
AARON ENHIMOTO, P.E.
Chief Staff Engineer



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

December 2, 1992

Dr. John C. Levin, Director
Department of Health
P.O. Box 1378
Honolulu, HI 96813

Dear Dr. Levin,

We are in receipt of your department comments dated November 24, 1992 on the pre-draft Environmental Assessment for the Integrated Solid Waste Facility at Hailua, Molokai. We respond to your comments as follows:

- 1. Water Pollution** - As this proposed project nears final construction drawings, the determination on whether there will be "discharge on the waters of the State" will become more apparent. At the present time, the mitigative design measures for both run-on and run-off waters are in compliance with applicable County building code standards. The plans as they are available for review, will be provided to the Maui County Project Engineer for his review and comment.
- 2. Drinking Water** - The concerns of the Safe Drinking Water Branch have been forwarded to the retained engineering consultants by this letter and response. From their research and design work of this project at this location the conclusion was that a bottom liner is not needed for leachate control. Your concerns will be reviewed and evaluated again by our staff and the consultants.
- 3. Solid Waste** - The two comments from the Office of Solid Waste Management have been forwarded to the design consultants for their consideration and future treatment. A future land use policy change that could generate additional daily tonnage is certainly a possibility and we should plan in that direction if this is the desire of the Molokai community.

Thank you for comments and continuing interest.

Yours very truly,

David P. Wissmar
David P. Wissmar, Chief
Solid Waste Division

cc:Parametrix, Inc. Kirkland Office

BARRY MAGNIN, L.S., P.E.
Land Use and Permit Administration
EASIE MILLER, P.E.
Wastewater Regulation Division
LLOYD PCW LEE, P.E.
Engineering Division
DAVID WISSMAR, P.E.
Solid Waste Division
BRUNN KASHIRO, P.E.
Highways Division

Letter: 12/2/92
Dr. John C. Levin, Dir
Dept. of Health

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PARAMETRIX, INC.
HONOLULU



JOHN C. LEWIN, M.D.
Director of Health

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96811

In reply, please refer to:

November 24, 1992

92-395/epo

Mr. F. J. Rodriguez
Parametrix, Inc.
1164 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

Dear Mr. Rodriguez:

Subject: Preliminary Environmental Assessment
Solid Waste/Sanitary Landfill Facility
Naiwa, Molokai

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Water Pollution

A National Pollutant Discharge Elimination System (NPDES) permit is required for any discharge to waters of the State including the following:

1. Storm water discharges relating to construction activities for projects greater than five acres;
2. Storm water discharges from industrial activities;
3. Construction dewatering activities;
4. Cooling water discharges less than one million gallons;
5. Ground water remediation activities; and
6. Hydrotreating water.

Any person wishing to be covered by the NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 90 days prior to commencement of discharge to waters of the State.

If you should have any questions on this matter, please contact Mr. Denis Lau of the Clean Water Branch at 586-4309.

Mr. F. J. Rodriguez
November 24, 1992
Page 2

92-395

Drinking Water

1. The project site is located below the Underground Injection Control (UIC) line.
2. We do not understand the meaning of the last sentence in item II.A.6.c. (Bottom lines and leachate collection) on page 5. The phrase "...the bottom grades ..." should be further explained to clarify the extent and detail of the evaluation regarding a bottom liner. It appears that the evaluation is being slanted away from the use of bottom liner; consequently, a leachate collection system will not be implemented.

If you should have any questions on this matter, please contact Mr. Chauncey Hew of the Safe Drinking Water Branch at 586-4258.

Solid Waste

1. A brief discussion regarding the management of recycled materials should be provided. Section V, page 10, should discuss the alternative of shipping waste off island and the need to modify the design and construction if the 20 tons per day limit for small community exemptions is exceeded.
2. A discussion regarding the compost facility should be provided. The preliminary environmental assessment implies that there will be users for the compost material on Molokai.

If you should have any questions on this matter, please contact Mr. John Harder of the Office of Solid Waste Management at 586-4277.

Due to preliminary plans being the sole source of discussion, we reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

Very truly yours,

John C. Lewin
JOHN C. LEWIN, M.D.
Director of Health

c: Clean Water Branch
Safe Drinking Water Branch
Office of Solid Waste Management

LINDA CROCKETT UNGLE
Mayor
GEORGE N. KAYA
Director
CHARLES JENCKS
Deputy Director
AARON SHIMMOTO, P.E.
Chief Staff Engineer



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

December 2, 1992

Mr. William W. Paty, Chairperson
Board of Land & Natural Resources
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Paty,

We are in receipt of your department comments dated November 18, 1992 and November 23, 1992 respectively on the pre-agency draft Environmental Assessment for the Molokai Integrated Solid Waste Facility at Maui, Molokai. We respond to those comments as follows:

1. The Historic Preservation Division request to amend item D on page 11 of the draft E.A. has been completed to reflect the "no effect" on significant historic sites evaluation. Further, the consultants have been advised to contact Ms. Annie Griffin regarding the revision of their report to reflect a summation of settlement patterns for the Maui ahupua'a.
2. The Water Resource Management Commission concerns on potential leachate migration has been evaluated by the design consultants who are designing the final elements of the landfill portion of the ISWF. As you know, the project involves an extremely limited daily volume of refuse, and there is an effort to recycle a significant amount of the daily volume in composting, metals, glass, paper, plastic re-use. The goals and objectives of this project are to limit total landfill practices that historically placed all materials in the ground. The project design team will continue the concerns on leachate migration and make their recommendations to our office.

RALPH MAGAMINE, L.S., P.E.
Land Use and Coastal Administration
EASIE MILLER, P.E.
Waste Management Division
LLOYD P.C.W. LEE, P.E.
Engineering Division
DAVID WISSMAR, P.E.
Solid Waste Division
BRIAN HANSHIRO, P.E.
Highways Division

Thank you for your continuing interest and cooperation.

Yours very truly,

David P. Wissmar
David P. Wissmar, Chief
Solid Waste Division

cc: Mr. Dwight Miller-Kirkland Office
Aki Sinoto Consulting

Letter 12/2/92
Mr. William W. Paty, Chairperson
Board of Land & Natural Resources

JOHN WAIHEE
GOVERNOR OF HAWAII

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PARAMETRIX, INC.
HONOLULU

REF:OCEA:SKK

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P.O. BOX 621
HONOLULU, HAWAII 96809

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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DONA L. MANAIKE

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PROGRAM
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ENFORCEMENT
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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION PROGRAM
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

NOV 23 1992

FILE NO.: 93-230
DOC. NO.: 1796

Mr. Fred J. Rodriguez
Parametrix, Inc.
1164 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

Dear Mr. Rodriguez:

SUBJECT: Preliminary Environmental Assessment (PEA) for the Proposed
Solid Waste/Sanitary Landfill Facility at Naiwa, Molokai

Thank you for giving our Department the opportunity to comment on this matter. We have reviewed the material you submitted and have the following comments.

Commission on Water Resource Management Comments:

Even though the proposed solid waste/sanitary landfill is located below the UIC line, we are concerned that leachate could migrate downwards and affect brackish ground-water resources. We strongly recommend that a bottom liner be used that is compatible with EPA or state requirements. Without a liner, pollution of coastal basal ground-water springs and agricultural wells is a real possibility.

We also recommend that the top surface of the landfill be constructed in such a way that erosion from Kona storms will not occur, and that the surface and contents within the landfill are not redeposited somewhere else.

Our Division of Forestry and Wildlife does not object to the proposed request for a solid waste/landfill at Naiwa, Molokai.

Mr. F. Rodriguez

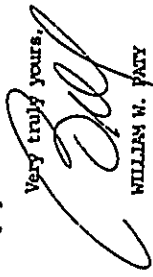
-2-

File No.: 93-230

In addition, our Historic Preservation Division will respond in a separate letter.

Thank you for your cooperation in this matter. Please feel free to call Sam Lemo at our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions.

Very truly yours,



WILLIAM W. PATEY

RECEIVED
NOV 25 1992

PARAMETRIX, INC.
MEMPHIS, TN

November 18, 1992

LOG NO.: 6650
DOC NO.: 9211AG18

MEMORANDUM

TO: Roger Evans, Administrator
Office of Conservation and Environmental Affairs

FROM: Don Hibbard, Administrator *DH*

SUBJECT: Preliminary EA for the Proposed Solid Waste/Sanitary
Landfill Facility (File No. 93-230)
Naiva, Molokai
THKI 5-2-III 27

Section III on pages 7-8 of this Draft EA does not include a discussion on the archaeological survey that was conducted in the project area. There should be a separate item under this section summarizing the results of the archaeological survey conducted by Aki Sinoto Consulting (attached to the EA as Exhibit C).

This report states that no historic sites were identified in the project area. The absence of historic sites is attributed to the extensive disturbance caused by quarrying and military activities. Given the negative findings of this study, a statement that the project will have "no effect" on significant historic sites should be added under Item D on page 11.

We have one comment on the report and we believe that it should be revised and re-submitted to our office for final acceptance. There should be a section summarizing the settlement pattern for the Ahupua'a of Naiva in general and the project area in particular.

Please contact Annie Griffin at 587-0013 if you have any questions.

AG:eal



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858-3440

REPLY TO
ATTENTION OF:

Planning Division

Mr. P. J. Rodriguez
Parametrix, Inc.
1164 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

Dear Mr. Rodriguez:

Thank you for the opportunity to review and comment on the Preliminary Environmental Assessment for the Proposed Solid Waste/Sanitary Landfill Facility at Naiea, Molokai (TMK 5-2-11: 27). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. The project does not involve work in waters of the U.S.; therefore, a DA permit is not required.

b. According to the enclosed Federal Emergency Management Agency's Flood Insurance Rate Map, panel 150003-0040-C, dated September 6, 1989, the proposed project is located in Zone C (areas of minimal flooding).

Sincerely,

Xiuk Cheung, P.E.
Xiuk Cheung, P.E.
Director of Engineering

Enclosure

SENT BY: COX WASTE MGT DIV

11-23-92 : 1:25PM :

UNDER SECRETARY
OF THE ARMY
WASHINGTON, D.C.

GEORGE A. JAY
DIRECTOR
CHARLES J. JENCKS
DEPUTY DIRECTOR
LLOYD P. W. LEE, P.E.
CHIEF OF ENGINEERING



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
225 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RECEIVED
NOV 23 1992

PARAMETRIX, INC.
HONOLULU

November 13, 1992

Mr. Xiuk Cheung, P.E.
Department of the Army
U.S. Army Engineering District, Honolulu
Building 230
Fort Shafter, Hawaii 96858-3440

Dear Mr. Cheung:

SUBJECT: PRELIMINARY ENVIRONMENTAL ASSESSMENT - MOLOKAI
INTEGRATED SOLID WASTE MANAGEMENT FACILITY

We have received your comments dated November 3, 1992 on the Preliminary Environmental Assessment being circulated for pre-agency consultation. We not your specific references to the project as follows:

1. The project will not require a Department of the Army permit for compliance with applicable DA regulations.

2. The project is located within Zone C, "area of minimal flooding."

These items will be duly noted in the formal Draft Environmental Assessment currently under final preparation prior to circulation in the OEQC Bulletin.

Thank you for your timely response and continued cooperation.

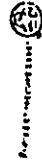
Very truly yours,
David F. Weissmar
DAVID F. WEISSMAR
Solid Waste Division Chief

DFW:jlp

cc: Parametrix, Inc.

15

ALAN SPINALE, P.E.
LIFE OF THE EARTH
EASTIE MILLER, P.E.
WILLIAM R. RICHMOND, P.E.
RALPH KAGAN, P.E.
BRUCE W. HARRIS, P.E.
BRIAN W. HARRIS, P.E.
ALAN SPINALE, P.E.
ALAN SPINALE, P.E.
ALAN SPINALE, P.E.



SENT BY: CON WASTE MGT DIV

11-23-92 : 1:20PM :

8082437425-

IN 2

LINDA CROCKETT LINGLE

Chief Engineer

GEORGE N. MAYA

Director

CHARLES JENCKS

Deputy Director

AARON SHIMMOTO, P.E.

Chief Engineer



COUNTY OF MAUI

DEPARTMENT OF PUBLIC WORKS

200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

November 20, 1992

Mr. Rex D. Johnson, Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Johnson:

SUBJECT: PRE-AGENCY COMMENTS ON THE ENVIRONMENTAL
ASSESSMENT FOR THE PROPOSED MOLOKAI INTEGRATED
SOLID WASTE MANAGEMENT FACILITY

We are in receipt of your department comments dated November 2, 1992 on the Preliminary Environmental Assessment (PEA) for the Integrated Solid Waste Management Facility at Nalwa, Molokai. We respond as follows:

1. Preventative measures to deter illegal trash dumping at the access road connection will be primarily an educational/community awareness program. County policy on landfill operations throughout the State has suffered with this problem and funding to station a guard is not cost effective.
2. The facility at Nalwa is set back from Maunaloa Highway sufficiently to deal with "wind blown" trash. Also, the recycling and composting features of this proposed project will utilize the combustibles for possible fuel material.
3. All access road and intersection connections within the State right-of-way will be provided by the County to the State Highways Division for review.

SENT BY: CON WASTE MGT DIV

11-23-92 : 1:20PM :

8082437425-

IN 3

Mr. Rex D. Johnson
Department of Transportation
ISWMP at Nalwa, Molokai
November 20, 1992
Page 2

Thank you for your timely comments and we look forward to your continuing concern and cooperation.

Very truly yours,

DAVID F. WISSMAR
Solid Waste Division Chief

DFW:jjp

cc: Parametrix, Inc.

JOHN WAIHEE
GOVERNOR

RECEIVED
NOV 03 1992

PARAMETRIX, INC.
HONOLULU



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION

869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

November 2, 1992

REX D. JOHNSON
DIRECTOR

DEPUTY DIRECTORS
JOYCE T. OMINI
AL PANG
JEANNE K. SCHULTZ
CALVIN M. TSUDA

IN REPLY REFER TO:

HWY-PS
2.4420

Mr. Fred J. Rodriguez
Parametrix, Inc.
1164 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

Dear Mr. Rodriguez:

Preliminary Environmental Assessment for
Proposed Solid Waste/Sanitary Landfill
Facility at Naiwa, Molokai

Thank you for your letter of October 22, 1992, requesting our review and comments on the subject document.

We have the following comments:

1. The EIS should mention preventive measures to be implemented to deter possible illegal dumping of trash at the access road connection at Maunaloa Highway.
2. Wind blown debris/litter that could accumulate along Maunaloa Highway may create visual impacts. The EIS should address measures to prevent this from happening.
3. Construction work within our State highway right-of-way requires submittal of plans for our review and approval.

Sincerely,

Rex D. Johnson
Director of Transportation

SENT BY: CON WASTE MGT DIV

11-23-92 : 1:28PM :


8082437425-

18 8

The Honorable Houluku Drake, Chairman
Department of Hawaiian Homelands
ISWAF at Naliwa, Molokai
November 20, 1992
Page 3

Your timely and specific comments are appreciated. Thank you for your cooperation and continuing interest.

Very truly yours,


DAVID P. WISSMAR
Solid Waste Division Chief

Attachments

cc: Parametrix, Inc.



United States Department of the Interior
FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS OFFICE
P.O. BOX 40117
HONOLULU, HAWAII 96840

Mr. Michael T. Huneikiyo
Michael T. Huneikiyo Consulting
79-A Church Street
Wailuku, Hawaii 96793


Dear Mr. Huneikiyo:

This replies to your November 26, 1990 request for our review of the proposed construction of a temporary landfill at Naliwa, Molokai, Hawaii.

We have reviewed the proposal and find that the project, as described in your letter, will not be likely to affect any resources of our concern. It does not appear that any wetlands will be affected, nor are any listed or proposed endangered or threatened species of plants or animals found in the vicinity of the project.

Thank you for the opportunity to review your proposal.

Sincerely yours,


William R. Kramer
Deputy Field Office Supervisor
Fish and Wildlife Enhancement

November 30, 1990

DEC 01

SENT BY: COM WASTE MGT DIV

11-23-92 : 1:27PM ;

8082437425-

LINDA CROCKETT LUNOLE
11/2/92

GEORGE A. KAYA
Director
CHARLES J. JENSEN
Deputy Director
ALAN B. SHIMMOTO, P.E.
Chief Est. Engineer



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

November 20, 1992

The Honorable L. Drake, Chairman
State of Hawaii
Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

Dear Mrs. Drake:

SUBJECT: PRE-AGENCY COMMENTS ON THE ENVIRONMENTAL
ASSESSMENT FOR THE PROPOSED MOLOKAI INTEGRATED
SOLID WASTE MANAGEMENT FACILITY

We have received your agency's comment dated November 6, 1992 on the proposed Molokai project and we have discussed them with Mr. Joe Chu of your planning staff. For the most part, the concerns were not critical, but we're interested in obtaining information due to the close proximity of your agency's lands to the proposed project site.

Also, I advised Mr. Chu that on December 9, 1992 at 3:00 p.m., there will be a public information briefing at the Mitchell Pauole Center in Kaunakakai. The Molokai Planning Commission has placed this project on their agenda so that residents on Molokai can hear the representation that will be put on by the Maui County Department of Public Works, Solid Waste Division and the consultant firm. We will respond specifically at that time to the concerns on the physical aspects of the proposed landfill design and make available the design parameters that have guided the design phase of this facility.

We will respond at this time to the specific comments made by your staff:

1. There will be no hazardous materials permitted in the ISWMPF for permanent placement. As described, the ISWMPF will be a pilot program to "Integrate traditional landfill operations with a recycling component for metals, glass, plastic, paper products, and household hazardous waste. Also, to be included in the program will be composting and mulching of green organic waste." All hazardous materials as defined by the State Department of Health Hazardous

SENT BY: COM WASTE MGT DIV

11-23-92 : 1:27PM ;

8082437425-

The Honorable Hoallu L. Drake, Chairman
Department of Hawaiian Home Lands
Molokai ISWMPF at Naliwa, Molokai
November 20, 1992
Page 2

Waste Branch will be collected for further onsite treatment prior to disposal, or for transport off island to be consolidated into a State wide collection system and trans-shipped out of state.

2. The comments in Item 2 are operational questions which will be the principal responsibility of the ISWMPF operator. In view of the limited daily waste stream volume, the operation is not anticipated to create significant or adverse noise, dust, or other traditional landfill impacts.
3. The comment on the specific layout dimensions for the landfill portion of the ISWMPF is a good suggestion since the confusion leading up to your misunderstanding that the cell structure for each phase of refuse placement will be to a "depth of 70 feet" is erroneous. A more accurate description would be to describe the cell structure and ultimate design capacity as "The 30-year landfill will be approximately 12 acres and 70 feet thick." (Page 4 Section 6c.) The balance of the design controls on leachate migration, the existing soils conditions, the perimeter drainage and surface water runoff/run-on controls, and landfill gas management are direct quotes from the preliminary engineering design report. Wetland impacts have been reviewed and discussed with the Federal Department of the Interior, Fish & Wildlife Service in earlier correspondence (copy enclosed) and it is their stated position that impacts on the wetlands will not be of consequence.
4. These items on surface/storm water runoff controls are also described on page 5, section 6c.
5. Leachate control on whether or not a bottom liner will be utilized is discussed on page 4, section 6c.
6. Availability of water for both potable and fire control purposes will be a vital item for consideration. This is due to the relatively dry and arid environment at the Naliwa site. Daily water trucks or onsite storage tanks are options under review.
7. County employee compensation is outside the scope of this E.A.

JOHN WAIHIE
GOVERNOR
STATE OF HAWAII

RECEIVED
NOV 10 1992

PARAMETRIX, INC.
P.O. BOX 1107
HONOLULU, HAWAII 96813

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1079
HONOLULU, HAWAII 96813



HONOLULU, HAWAII
HAWAIIAN HOMES COMMISSION

Mr. F.J. Rodriguez
Parametrix, Inc.
1164 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

Dear Mr. Rodriguez:

Subject: Draft Environmental Assessment for Molokai
Integrated Solid Waste Facility

Some of the lands along the shoreline directly makai of the proposed project are Hawaiian home lands under the jurisdiction of the Department of Hawaiian Home Lands (DHHL).

The DHHL suggests that prior to determining that an EIS is not required, the following information should be provided and assessed:

1. The types, composition, and amounts of waste should be estimated and the handling requirements necessary to assure public and environmental safety should be discussed. Specify if any dangerous chemicals or toxic materials are expected.
2. The Facility Layout map showing the arrangement and relative sizes of the various proposed improvements and operations provides a good overview of the project area. However, the various activities should also be described and their likely impacts discussed in more detail; e.g., measures to minimize noise, dust, windblown trash, potential hazards, etc., that usually accompanies the sorting, crushing, baling, mulching and other operations that will be undertaken at the recycling and composting facilities.
3. The dimensions of the landfill and how its 70 feet depth will relate to the soil layers on the site should be described. The 8 feet ash layer reported at

Mr. F.J. Rodriguez
Page 2
November 6, 1992

depths between 14 feet and 27 feet may be highly permeable and a potential route for migration of leachate into the wetlands along the shoreline, only about one mile away. The wetlands are reported critical habitat for endangered native plants and birds.

4. The characteristics of storm runoff anticipated in the two gulches which adjoin the project area should be evaluated relative to the potential for water intrusion, soil erosion, and the escape of leachate from the sides of the landfill.
5. The overall design and construction of the landfill, especially the bottom and side linings, should be described in more detail and evaluated against the need to prevent leachate from migrating into agriculture, aquaculture, and the wetland areas which are situated downhill from the project.
6. The source, quality, and amounts of water that will be required to operate the landfill should be indicated.
7. The numbers, types and pay ranges of the jobs that will be created should be indicated.

Thank you for the opportunity to comment on your draft. Should you have any questions, please feel free to call Joe Chu of our Planning Office at 586-3838.

Warmest aloha,

Honolulu, Hawaii
Honolulu, L. Drake
Hawaiian Homes Commission

HLD:BH:JC:asy/2604L.7

cc: County of Maui, Department of Public Works
Office of Environmental Quality Control (OEQC)

SENT BY:COM WASTE MGT DIV

:11-23-92 : 1:29PM ;

8082437425

三

LINDA CROCKFORD SINGLE

RECEIVED
GENERAL INVESTIGATIVE
DIVISION

[illegible]

RECLAMATION DIVISION
COUNTY OF MAUI



**COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS**

200 SOUTH HIGH STREET,
WAILUKU, MAUI HAWAII 96793

November 18, 1992

November 18, 1992

AARON BHINIMOTO, P.E.
Land Use and Codes Administration

KARLSE MILLER, P.E.
Wastewater Reclamation Division

RALPH NAGAMINE, P.E.
Engineering Division

BRYAN NASHIRO, P.E.
Solid Waste Division

MELVIN HIPOLITO
Highways Division

MEMO TO: EASSIE MILLER, CHIEF
WASTEWATER RECLAMATION DIVISION

FROM: DAVID WISSEMER, CHIEF
SOLID WASTE DIVISION *Outflow' W. P. Wissemmer*

SUBJECT: MOLOKAI INTEGRATED SOLID WASTED FACILITY
DRAFT ENVIRONMENTAL ASSESSMENT

We have received your comments on the pre-agency consultation draft E.A. for the Naiva, Molokai ISMP and we respond as follows:

1. Composting materials will consist almost entirely of private/residential and commercial yard trimmings. County maintenance will also be contributors to the composting waste stream.
2. Traffic at the entry point to the ISWF will need to be coordinated with the adjacent quarry operation and also with the State Department of Transportation to insure safe and efficient traffic flow. All final road designs will be reviewed and approved by the appropriate agencies.
3. Estimated costs for the design and construction of this proposed facility are still being developed. Funding will be provided by the County and it is planned that the project will be implemented in six phases of five years each.

Thank you for your timely comments and constructive interaction.

[illegible]

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11-13-82 : 2:41PM :

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23.

LINDA SPOCKETT LINDLE

GEORGE H. KAYA

Director

Deputy Director
CRJ207J03000000

LLOYD P.C.W. L.L.P.
Credit Risk Experts



COUNTY OF MAUI

DEPARTMENT OF PUBLIC WORKS

300 SOUTH HIGH STREET
WAILUKU, MAUI HAWAII 96791

November 6, 1992

AARON SHIMOTO, P.E.
Land Use and Codes Administration

EASIE WILLER, P.E.
Waste/water Reclamation Division

RALPH MACGAMINE, P.E.
Engineering Division

BRIAN HASKING, P.E.
Solid Waste Division

MELVYN HIPOLITO
Highways Division

MEMO TO: DAVID WISSMAR, SOLID WASTE DIVISION CHIEF

FROM: EASSIE MILLER, WASTEWATER RECLAMATION DIVISION CHIEF *eml*

SUBJECT: PRELIMINARY ENVIRONMENTAL ASSESSMENT FOR
THE PROPOSED SOLID WASTE/SANITARY LANDFILL FACILITY
AT NAIWA, MOLOKAI

The following are our comments on the subject preliminary environmental assessment:

1. What will be composted? We have concerns regarding odor generated.
2. Discuss traffic impacts (access from highway).
3. Economics issue - address cost of project and how funded.
4. Discuss land zoning, community plan designation, etc.

Should you have any questions, please feel free to call me.

EM:ym(iM93099)

LINDA CROCKETT LINGLE
Mayor
GEORGE N. KAYA
Deputy Mayor
CHARLES JENCKS
Deputy Director
LLOYD F. W. LEE, P.E.
Chief Sanitary Engineer



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RECEIVED
NOV 16 1992

PARAMETRIX, INC.
HONOLULU

November 12, 1992

MEMO TO: MR. BRIAN MISKAE, PLANNING DIRECTOR
FROM: DAVE WISSMAR, SOLID WASTE DIVISION CHIEF
SUBJECT: PRELIMINARY ENVIRONMENTAL ASSESSMENT - MOLOKAI
INTEGRATED SOLID WASTE MANAGEMENT FACILITY

Thank you for your agency's comments dated October 16, 1992 on our proposed project. We will provide the responses to your comments in the formal Draft Environmental Assessment currently under preparation and which will also be published in the OEQC Bulletin for a thirty day review.

During this preparation period, we are working closely with Clay Yoshida of your staff on the planning aspects of the project and will coordinate our efforts with him to insure a timely processing of the Special Use Permit (SUP).

Thank you for your cooperation and continued interest.

DFW:jip

cc: Andrew Hirose, Project Manager
Parametrix, Inc.

ALAN SHIMMOTO, P.E.
Land Use and Codes Administration
EASIE MILLER, P.E.
Waste Reclamation Division
RALPH NAGALUKE, P.E.
Engineering Division
BRIAN MASHIRO, P.E.
Solid Waste Division
MELVIN HOKUTO
Highways Division

SENT BY: COUNTY OF MAUI

10-21-92 : 2:08PM :

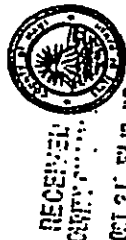
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18 2

LINDA CROCKETT LINGLE
Mayor

BRIAN W. MISKAE
Director

ROBERT K. KLEUNA, JR.
Deputy Director



RECEIVED
COUNTY OF MAUI
1992 OCT 21 PM 12:42

COUNTY OF MAUI
PLANNING DEPARTMENT
300 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

October 16, 1992

To: Andrew Hirose
Thru: Dave Wissmar, Chief
Solid Waste Division
From: Brian Miskae, Planning Director
Subject: Draft Environmental Assessment - Molokai Integrated
Solid Waste Facility

We have reviewed the Draft Environmental Assessment for the Molokai Integrated Solid Waste Facility and offer the following comments:

1. On page 1, the intended action is for a Land Use Commission Special Use Permit and not a County Special Use Permit. Chapter 343 review is required because of the expenditure of County and/or State funds.
2. Has the subject property been conveyed from Molokai Ranch to the County of Maui?
3. Some mention should be made about the ag. suitability rating of the parcel and how poor it is for most agricultural uses.
4. How does the project intend to get the water needed to meet the fire flow requirements?

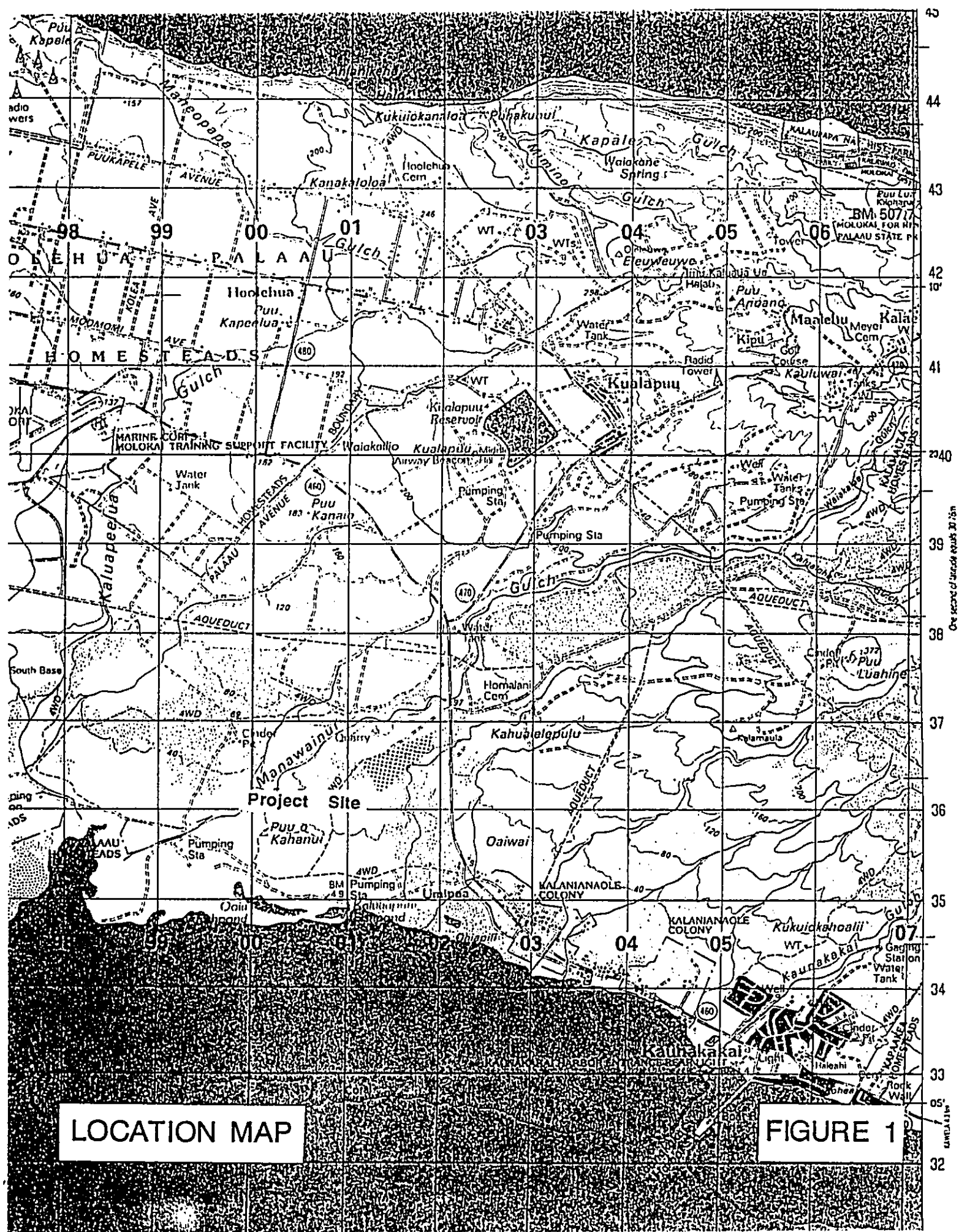
Thank you for providing us with the opportunity to review the draft environmental assessment. Should you have any questions, please contact Clayton Yoshida of this office.

cc: Colleen Suyama
Clayton Yoshida, AICP

IX. LIST OF PREPARERS

County of Maui - Department of Public Works, Solid Waste Division

Parametrix, Inc.



BOTANICAL SURVEY
MOLOKA'I SANITARY LANDFI

by

Winona P. Char
CHAR & ASSOCIATES
Botanical/Environmental Consultants
Honolulu, Hawai'i

Prepared for: COUNTY OF MAUI
December 1990

EXHIBIT A

BOTANICAL SURVEY
MOLOKA'I SANITARY LANDFILL

INTRODUCTION

The proposed Moloka'i Sanitary Landfill is located south of an existing quarry and to the west of Kamehameha V Highway (Highway 460). The proposed project includes a 40-foot wide access road, approximately 2,200 ft. long. The landfill site will cover roughly 57 acres. The first increment will cover 14 acres; later expansion will include ± 43 acres. Elevation ranges from about 50 ft. along the southwestern corner of the landfill site to about 90 ft. along a portion of the access road. The road alignment and landfill site have already been flagged and staked by the County.

Field studies to assess the botanical resources found on the proposed landfill site and along the access road were conducted on 05 December 1990 by two botanists. The primary objectives of the survey were to 1) describe the general vegetation; 2) inventory the vascular plant species; and 3) search for threatened and endangered plants protected by Federal and/or State laws.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Recent topographic maps were examined to determine terrain characteristics, access, boundaries and reference points.

Access was from the nearby quarry road which, for the most part, runs parallel to the project's planned access road. The survey engineers had flagged the road alignment and landfill site prior

to our field studies.

A walk-through survey method was used. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium (Univ. of Hawai'i, Manoa) and for comparison with the recent taxonomic literature. Notes were made on plant associations and distribution, substrate types, topography, exposure, etc.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. A survey taken at a different time and under varying environmental conditions would no doubt yield slight variations in the species checklist, especially of the weedy, annual taxa.

DESCRIPTION OF THE VEGETATION

Vegetation on the project site as well as the surrounding areas is dominated by two introduced or alien species, kiawe (Prosopis pallida) and buffel grass (Cenchrus ciliaris). However, from 30 to 50% of the ground is bare and the shallow topsoil has been eroded in many places, leaving weathered, soft bedrock exposed. Many rocks, about 4 to 6 inches in diameter, are found on the surface. Small, shallow gullies are common throughout the landfill site and the adjacent lands. The soils have been classified as "rVT2" -- very stony land, eroded (Foote et al. 1972).

On the landfill site, kiawe trees form an open woodland with tree cover about 30% and from 18 to 20 ft. high. Scattered koa-haole shrubs (Leucaena leucocephala) are also common. Buffel grass forms a mat up to 2 ft. high, becoming much denser under the trees and shrubs. Many of the weedy species associated with this kiawe/buffel grass vegetation type were still in the seedling stages at the time of the survey. Some of the more commonly occurring species found include red pualele (Emilia fosbergii),

pepper grass (Lepidium virginicum), smooth rattlepod (Crotalaria pallida), and wild bittermelon (Momordica charantia). A few mature plants of partridge pea (Chamaecrista nictitans), virgate mimosa (Desmanthus virgatus), and cow pea (Macroptilium lathyroides) also occur on the site.

Along the proposed road alignment, the vegetation is less dense with the kiawe trees scattered, about 10% cover, and with the buffel grass forming scattered clumps or tussocks. Bare eroded areas are more numerous along the road alignment. Common along this portion of the project site are small shrubs or subshrubs of 'ilima (Sida fallax) and 'uhaloa (Waltheria indica). A few scattered klu shrubs (Acacia farnesiana) are occasional. Where portions of the alignment come close to the quarry road, old equipment from quarrying operations as well as piles of soil and rock material are found.

DISCUSSION AND RECOMMENDATIONS

There is very little of botanical interest or concern on the project site as the vegetation is composed primarily of introduced plant species. Of a total of 21 species inventoried on the site, 17 (81%) are introduced or alien and 4 (19%) are indigenous, i.e. native to the Hawaiian Islands and elsewhere. No plants native only to the Hawaiian Islands (endemic) or originally of Polynesian introduction were found. No threatened or endangered plants were found or are known to occur on the site (U. S. Fish and Wildlife Service 1989, 1990). No sensitive native plant communities occur on the site.

The vegetation appears to have been grazed by cattle at one time as there were many very weathered "cow pies" throughout the site. Very old droppings from goat or axis deer were also found. Portions of the site nearest the quarry road have been bull dozed and disturbed at some time.

In summary, the proposed landfill and access road are not expected to have a significant negative impact on the botanical resources of the site as it is dominated by introduced plants. All of the species found on the site also occur in abundance or are common throughout the islands in similar environmental conditions.

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PLANT SPECIES CHECKLIST--Moloka'i Sanitary Landfill

The following is a checklist of the vascular plants inventoried during the field studies at the proposed project site. The plants are divided into two groups, Monocots, and Dicots. Within these groups, the species are presented taxonomically by family, with each family, and each species in the family, in alphabetical order. The taxonomy and nomenclature follow Wagner et al. (1990). In most cases, common English and/or Hawaiian names listed here have been taken from St. John (1973) or Porter (1972).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name, when known.
3. Biogeographic status. The following symbols are used:

I = Indigenous (native to Hawai'i as well as other geographic areas).

X = Introduced or alien (not native, introduced to Hawai'i either accidentally or intentionally, after the advent of the Europeans.

FAMILY	Species	Common Names	Status
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MONOCOTS

POACEAE (Grass Family)

<u>Cenchrus ciliaris</u> L.	Buffel grass	X
<u>Panicum maximum</u> Jacq.	Guinea grass	X

FAMILY		
Species	Common Names	Status
DICOTS		
BRASSICACEAE (Mustard Family)		
<u>Lepidium virginicum</u> L.	pepper grass	X
ASTERACEAE (Sunflower Family)		
<u>Emilia fosbergii</u> Nicolson	red pualele, emilia	X
<u>Tridax procumbens</u> L.	coat buttons	X
<u>Verbesina encelioides</u> (Cav.) Benth. & Hook.	golden crownbeard	X
<u>Xanthium strumarium</u> L.	cocklebur	X
CUCURBITACEAE (Gourd Family)		
<u>Momordica charantia</u> L.	wild bittermelon	X
FABACEAE (Pea Family)		
<u>Acacia farnesiana</u> (L.) Willd.	klu	X
<u>Alysicarpus vaginalis</u> (L.) DC.	alysicarpus	X
<u>Chamaecrista nictitans</u> (L.) Moench	partridge pea, lau-ki	X
<u>Crotalaria pallida</u> Aiton	smooth rattlepod	X
<u>Desmanthus virgatus</u> (L.) Willd.	virgate mimosa	X
<u>Leucaena leucocephala</u> (Lam.) de Wit	koa haole; ekoa	X
<u>Macroptilium lathyroides</u> (L.) Urb.	cow pea	X
<u>Prosopis pallida</u> (Humb. & Bonpl. ex Willd.) Kunth	kiawe, mesquite	X
MALVACEAE (Mallow Family)		
<u>Sida fallax</u> Walp.	'ilima	I
NYCTAGINACEAE (Four-o'-Clock Family)		
<u>Boerhavia</u> cf. <u>repens</u> R. Br.	alena, nena	I
PHYTOLACCACEAE (Pokeweed Family)		
? <u>Phytolacca octandra</u> L.	Southern pokeberry	X
SOLANACEAE (Nightshade Family)		
<u>Solanum americanum</u> Mill.	black nightshade, popolo	I?
STERCULIACEAE (Cocoa Family)		
<u>Waltheria indica</u> L.	'uhaloa	I

FIELD SURVEY OF THE AVIFAUNA AND FERAL MAMMALS
FOR A PROPOSED NEW LANDFILL AT NAIWA, MOLOKAI

Prepared for
County of Maui
Department of Public Works

Phillip L. Bruner
Assistant Professor of Biology
Director, Museum of Natural History
Environmental consultant - Faunal (Bird and Mammal) Surveys

7 January 1991

EXHIBIT B

INTRODUCTION

The purpose of this report is to summarize the findings of a one day (3 January 1991) field survey of the birds and mammals found on or near a 49.590 acre site at Naiwa, Molokai (Fig.1). Also included are references to pertinent literature and unpublished observations of faunal activity on similar lands. Finally, the report discusses some possible changes that might occur in the faunal community given the scope of the proposed development.

The objectives of the field survey were to:

- 1- Document what bird and mammal species occur on the property or may likely be found given the type of habitats available.
- 2- Provide some baseline data on the relative abundance of each species.
- 3- Assess the possible changes in the faunal communities that might occur as a result of habitat alteration following the proposed development. In the event that any special or critical habitat resources exist on or near the property provide recommendations regarding their protection.

GENERAL SITE DESCRIPTION

The project site is located on approximately 49 acres at Naiwa, Molokai (Fig.1). The topography of the property is gently sloping with flat plateaus. The dominant tree in the area is Kiawe (Prosopis pallida) with an understory of grass and native plants such as Ilima (Sida spp.). The general appearance of the habitat is parkland (scattered trees and grass).

Weather during the field survey was cloudy and cool. Winds were light from the NNE.

STUDY METHODS

Field observations were made with the aid of binoculars and by listening for vocalizations. Attention was also paid to the presence of tracks and scats as indicators of bird and mammal activity. The entire site plus nearby lands were covered on foot. A total of 10 census stations (Fig.1.) were established and eight minute counts provide the basis for the population estimates given in this report. Between these count stations additional observations of birds were also kept. Literature resources (Pratt et al. 1987; Hawaii Audubon Society 1989 and reports of bird observations made in somewhat similar habitat (Bruner 1989a, 1989b, 1989c) were also consulted in order to acquire a more complete picture of the potential species that could occur at this site.

Observations of feral mammals were limited to visual sightings and evidence in the form of scats and tracks. No attempts were made to trap mammals in order to obtain data on their relative abundance and distribution.

Scientific names used herein follow those given in the most recent American Ornithologist's Union Checklist (A.O.U. 1983), Hawaii's Birds (Hawaii Audubon Society 1989), A Field Guide to the Birds of Hawaii and the Tropical Pacific (Pratt et al. 1987), Mammal Species of the World (Honacki et al. 1982) and Hawaiian Coastal Plants (Merlin 1980).

RESULTS AND DISCUSSION

Resident Endemic (Native) Birds:

No endemic species were recorded during the field survey. Pueo or Short-eared Owl (Asio flammeus sandwichensis) do occur in lowland habitats on Molokai and could potentially forage at this site (Bruner 1988c, Hawaii Audubon Society 1989). No other endemic species would be expected on this property.

Migratory Indigenous (Native) Birds:

Pacific Golden Plover (Pluvialis fulva) -

Plovers prefer open areas for foraging such as mud flats, lawns and fields with short grasses. Prey items primarily include insects, crustaceans and a wide variety of other small invertebrates.

A total of three plover were recorded on the field survey. These birds were observed on the few open bare patches of ground or flying over the property. Johnson et al. (1981), Bruner (1983) and Johnson et al. (1989) have shown plover are extremely site-faithful on their wintering grounds (returning each day to the same spot and maintaining this behavior throughout their life time). Many plover also establish foraging territories which they defend vigorously. Such behavior makes it possible to acquire a fairly good estimate of the abundance of plover in any one area. These populations likewise remain relatively stable over many years (Johnson et al. 1989).

Ruddy Turnstone (Arenaria interpres) -

Ruddy Turnstone forage on lawns as well as in the intertidal zone. They typically occur in small flocks and are not known to be territorial but may exhibit some site-faithfulness tendencies (Fleisher 1985). Turnstone also compete with plover for many of the same types of prey. A total of five Ruddy Turnstone were recorded flying over the property.

No other migratory birds would likely be found with any regularity on or near this property. Coastal wetlands and intertidal areas makai of the site, however, support not only plover and turnstone but a variety of other shorebird and water-bird species (Hawaii Audubon Society 1989).

Seabirds:

No seabirds were observed. The presence of predators like the Small Indian Mongoose (Herpestes auropunctatus), feral cats and dogs as well as human disturbance prohibits this area from being suitable nesting habitat for seabirds.

Resident Indigenous (Native) Birds:

No resident indigenous species were recorded. Black-crowned Night Heron (Nycticorax nycticorax) occur on Molokai, but in wet-land habitat.

Exotic (Introduced) Birds:

A total of 13 species of exotic birds were recorded during the field survey. Table One shows the relative abundance of these species. The most numerous were Black Francolin (Francolinus francolinus), Zebra Dove (Geopelia striata) and Red-crested Cardinal (Paroaria coronata).

Species recorded in similar habitat elsewhere on Molokai (Pratt et al. 1987; Hawaii Audubon Society 1989; Bruner 1989a, 1989b, 1989c) include: Barn Owl (Tyto alba), Nutmeg Mannikin (Lonchura punctulata), Warbling Silverbill (Lonchura malabarica), Eurasian Skylark (Alauda arvensis) and Japanese Bush-warbler (Cettia diphone).

Feral Mammals:

Two feral cats were seen and dog tracks were abundant. Rats and mice were not observed but undoubtedly occur on the property. A total of four Small Indian Mongoose were also recorded. Based on the number of tracks and scats Axis Deer (Axis axis) are fairly common in this area. Without a trapping program it is, however, difficult to conclude a great deal about the relative abundance of rats, mice, cats, dogs and deer. Their numbers probably are comparable to similar habitats elsewhere on Molokai.

Records of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) are sketchy but the species likely occurs on Molokai (Tomich 1986). Little is known of their natural history, distribution and ecological requirements. No bats were recorded on this project site despite evening observations.

CONCLUSION AND RECOMMENDATIONS

A brief survey can at best provide a limited perspective of the wildlife present in any given area. Not all species will necessarily be observed and information on their use of the site must be sketched together from brief observations and the available literature. The number of species and the relative abundance of each species may vary throughout the year due to available resources and reproductive success. Species which are migratory will quite

obviously be a part of the faunal community only at certain times during the year. Exotic species sometimes prosper for a time only to later disappear or become a less significant part of the ecosystem (Williams 1987). Thus long term studies can best provide the insights necessary to acquire both a broad view as well as a more definitive perspective of the bird and mammal populations in a particular area. However, when brief studies are coupled with data gathered from other similar habitats the value of the conclusions which are drawn is significantly increased.

In terms of broad conclusions related to bird and mammal activity on the project site the following are offered:

- 1- The property at present provides a limited range of habitats which are utilized by the typical array of exotic birds one would expect in this type of environment on Molokai. Development of the property as a landfill would effectively eliminate the site as a breeding habitat but some species would make use of the area for foraging. Cattle Egret (Bubulcus ibis), Common Myna (Acridotheres tristis), Spotted Dove (Streptopelia chinensis), Zebra Dove (Geopelia striata) and House Sparrow (Passer domesticus) are species which would be most likely to prosper as a result of a landfill at this site.
- 2- Migrant species particularly Pacific Golden Plover and to a lesser degree Ruddy Turnstone are usually benefited by the

kind of development that creates open spaces. The clearing of this property may provide some additional land that would be attractive to these species.

- 3- The endemic Hawaiian Owl forages in lowland open grasslands as well as in higher forested habitat. This species preys on rodents and may be attracted to this area if rat and mice populations increase.
- 4- Significant changes in the feral mammal population should occur as a result of development. Landfills generally attract not only rodents but mongooses, cats and dogs as well.
- 5- This site is not special or unique in the way of habitat resources essential to birds and mammals in this region of the island. The only concern might be the effect of water contamination down slope at Ooia and Kaluaapuhi Fish ponds and surrounding wetlands. Care must be taken to prevent flooding of the landfill from reaching these waterbird habitats.

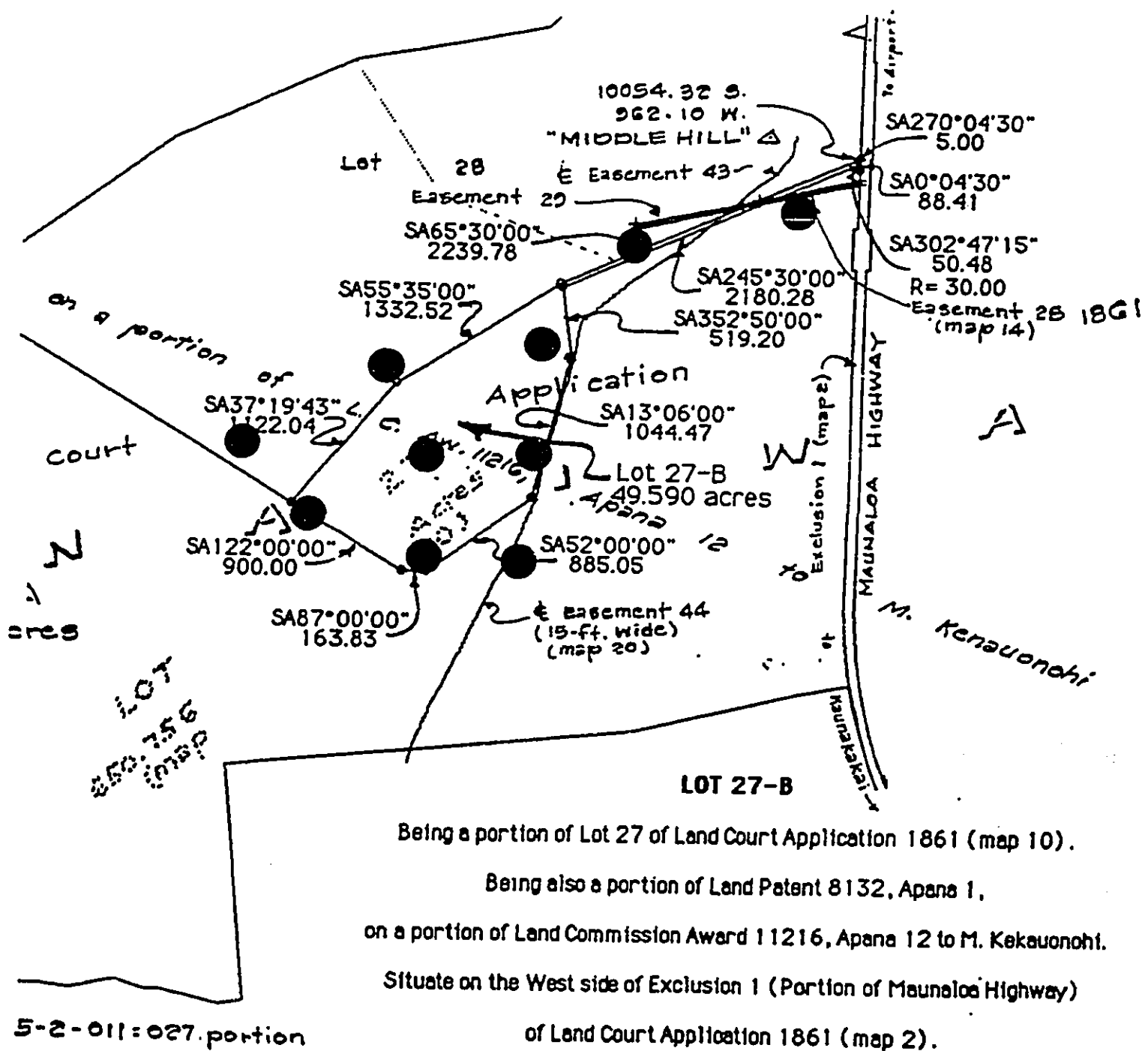


Fig. 1. Location of project site with faunal census stations marked by solid circles.

TABLL 1

Relative abundance of exotic birds recorded at Naliwa, Molokai.

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE*
Cattle Egret	<u>Bubulcus ibis</u>	R = 200+ (seen flying over site)
Ring-necked Pheasant	<u>Phasianus colchicus</u>	R = 1
Gray Francolin	<u>Francolinus pondicerianus</u>	R = 6
Black Francolin	<u>Francolinus francolinus</u>	A = 12
Spotted Dove	<u>Streptopelia chinensis</u>	C = 6
Zebra Dove	<u>Geopelia striata</u>	A = 10
Common Myna	<u>Acridotheres tristis</u>	U = 4
Japanese White-eye	<u>Zosterops japonicus</u>	C = 9
Northern Cardinal	<u>Cardinalis cardinalis</u>	U = 4
Red-crested Cardinal	<u>Paroaria coronata</u>	A = 10
Northern Mockingbird	<u>Mimus polyglottos</u>	U = 2
House Finch	<u>Carpodacus mexicanus</u>	C = 6
House Sparrow	<u>Passer domesticus</u>	R = 4

* (see page 11 for key to symbols)

KEY TO TABLE 1

Relative abundance = Determined by frequency on 8 min. counts in appropriate habitat.
Number which follows is average of all counts for that species in appropriate habitat.

A = abundant (ave. 10+)

C = common (ave. 5-10)

U = uncommon (ave. less than 5)

R = recorded but usually not on 8 min. counts (number which follows is total recorded over the entire duration of the field survey)

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ASC92-10

ARCHAEOLOGICAL INVENTORY SURVEY
OF THE MOLOKAI REFUSE DISPOSAL LANDFILL PROJECT
NAIWA, MOLOKAI ISLAND
(TMK 5-2-11:27 por)

by

Aki Sinoto
and
Jeffrey Pantaleo, M.A.

for

Parametrix, Inc.
1164 Bishop Street
Suite 1600
Honolulu, Hawai'i 96813

October 1992

EXHIBIT C

Aki Sinoto Consulting
2333 Kapiolani Blvd. #2704
Honolulu, Hawai'i 96826

ASC92-10

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INTRODUCTION

At the request of Parametrix, Inc., of Honolulu, Aki Sinoto Consulting of Honolulu, conducted an archaeological inventory survey of a 40 acre parcel of land in Naiwa, Molokai, that is slated for a refuse disposal landfill. The survey was conducted on September 10, 1992, by Jeffrey Pantaleo, Ronald Holt, and Tina Mangieri.

PROJECT AREA

The project area is located in the inland portion of Naiwa ahupua'a, Molokai Island (TMK 5-2-11:27 por)(Fig. 1). The project is bounded by a quarry to the north, an existing dirt road to the east, a gulch to the west, and an arbitrary boundary to the south.

ENVIRONMENT

The majority of the project area is located on gently sloping terrain surrounded by intermittent gulches. Elevation of the project area ranges from 50 to 100 ft (15 to 30 m) above sea level. Rainfall in the project area averages 10 to 20 inches a year, with most of the precipitation occurring during the winter months between November and April.

Vegetation in the project area is dominated by pili grass (*Heteropogon contortus*) and Kiawe (*Prosopis pallida*), and isolated stands of wiliwili (*Erythrina sandwicensis*) and Koa haole (*Leucaena glauca*).

Soil in the project area is Holomua Silt Loam, which occurs on 3 to 7% slopes in upland areas and is well-drained and severely eroded. These soils, used for pasture, pineapple, truck crops, and wildlife habitat, were developed from volcanic ash and material weathered from andesite rock. Runoff is slow to moderate and erosion hazard is moderate.

PREVIOUS ARCHAEOLOGY

According to Summers (1971), no known archaeological sites exist in the inland portions of Naiwa ahupua'a; however, several sites exist on the coastal areas of Naiwa ahupua'a, including State Site 50-60-03-104, Kaluaapuhi fishpond that is presently silted-in; State Site 50-60-03-106, petroglyphs; State Site 50-60-03-107,

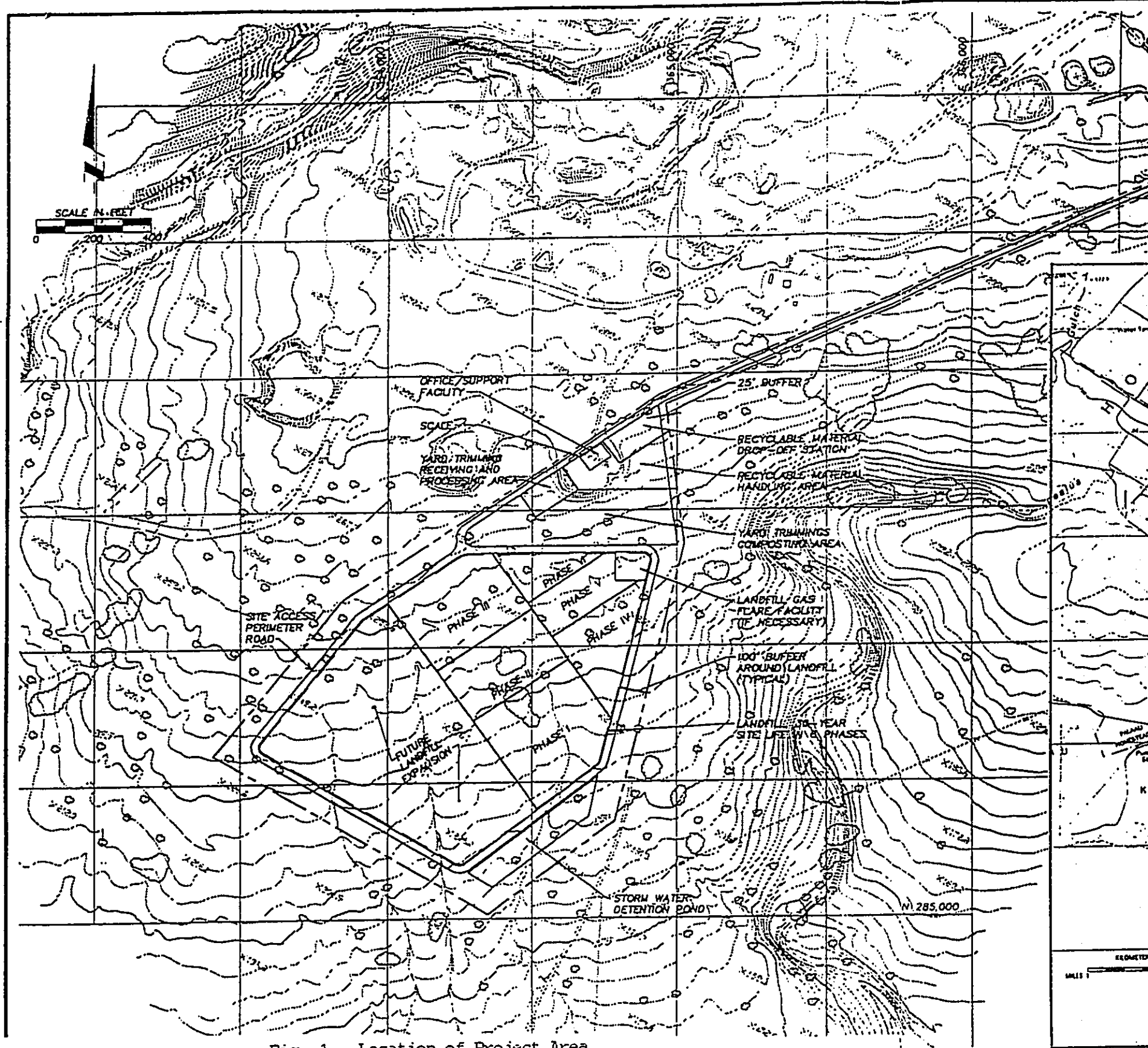


Fig. 1. Location of Project Area.

a holua slide at Kualapu'u; State Site 50-60-03-108, Kalakupale or Palakupale heiau; and Piliwale heiau, which was reported by native Hawaiians but not found.

Recently, archaeological investigations have concentrated in coastal areas of southwest Molokai and selected areas inland. No archaeological surveys have been undertaken within the subject project area.

In 1980, an archaeological reconnaissance survey was conducted for the proposed Molokai Electric Facility in Naiwa, Molokai (TMK 5-2-11:7). The project area, approximately 50 acres, was extensively disturbed by agricultural activities. Previously identified sites located in and nearby the project area include State Site 50-60-03-104, Kaluaapuhi Fishpond, and State Site 50-60-03-106, petroglyphs. One additional site recorded in the project area included an enclosure with associated midden.

Hommon and Ahlo (1983) conducted an archaeological survey of selected lands for the Pacific Division, Naval Facilities Engineering Command military training area in Kalama'ula, Kapa'akea, Kamiloloa, and Makakupaia (TMK 5-2-10:1; 5-4-03:3). Survey Area 1A, 2950 acres, is located adjacent to the west of the subject project area. Archaeological sites recorded in Area 1A included State Site 50-60-03-904, a cairn; State Site 50-60-03-905, a wall probably related to military activities; State Site 50-60-03-906, a rock alignment probably related to ranching activities; State Site 50-60-03-907, a recently excavated ditch; and State Site 50-60-03-908, a rock alignment probably related to military activities. Based on the criteria of the National Register of Historic Places, these sites were evaluated to be not significant. Results of the study indicated prehistoric land use focused on exploitation of marine resources supplemented by irrigated agriculture along stream bottoms and near spring outlets along the coast. Dryland agriculture, such as sweet potato, was evident along the slopes above the coastal plain.

Tomonari-Tuggle (1983) conducted an archaeological reconnaissance survey of a waterline corridor in the ahupua'a of Kalama'ula for the Department of Hawaiian Home Lands, DHHL. Archaeological sites recorded in the project area included State Site 50-60-03-800, a complex of walls, terraces, and cairns probably related to agricultural activities; State Site 50-60-03-801, seven cairns and a wall; and State Site 50-60-03-802, a cobble-filled, boulder-faced wall probably related to ranching

activities. Results of test excavations at Site 50-60-03-800 suggested a brief, single event occupation as early as A.D. 1200, with more intensive occupation beginning by A.D. 1400.

Athens (1985) conducted an archaeological investigation at the inland site on the leeward slopes of Central Molokai for the Hawaiian Home Lands, DHHL. Based on results from excavations and previous archaeological studies, Athens theorized a more complex settlement pattern for leeward Molokai. Athens suggested that occupation of the Kalama'ula area began at least 200-300 years prior to the dominant Kawela pattern, and that the area was visited 500 years before then (Athens 1985:98). Athens supports his theory by using available dates from State Site 50-60-03-800, 400 +/- 60 BP, 1000 +/- 60 BP, and 300 +/- 60 BP, and radiocarbon dates from a coastal hearth feature in Kaunakakai, 710 +/- 50 BP, and a coastal dune site at Kawela, 290 +/- 60 BP.

Griffin (1988) conducted a field inspection of the Kalama'ula Subdivision in Kamiloloa (east) and Makakupaia (west) for Hawaiian Home Lands, DHHL (TMK 5-2-10:1 por; 5-4-03:3 and 31 por). Results of the survey relocated previously recorded sites (904 and 906) by Hommon in 1983. Due to the absence of ground cover that exposed most of the surface, attention was concentrated in gulches.

Weisler (1989a) conducted an archaeological survey and excavation on approximately 115 acres mauka of Kaunakakai between the 130 to 250 ft. elevations. Results of the study suggested extensive dryland agricultural activities. Radiocarbon analysis suggested occupation occurred between A.D. 1200 to A.D. 1400.

Cleghorn and Pantaleo (1989 in prep.) conducted an archaeological surface survey along the southwest coast of Molokai for On-site Energy Company. The survey identified numerous sites along the coastal areas including ko'a and habitation and agricultural features. Inland portions of the project area indicated a sharp decrease in the number of sites, and those present are primarily related to agricultural activities.

Tomonari-Tuggle (1990) conducted an archaeological inventory survey of a portion of Kalama'ula ahupua'a for the Department of Hawaiian Home Lands, DHHL. Results of the survey identified 54 archaeological sites, 16 of which were tested. Types of sites

recorded include terraces, mounds, enclosures, rock shelters, ahu, and a modified cavity in a rock pile. Results of excavations revealed subsurface features including pits, marine shell, charcoal, ash lens, postholes, and hearths.

LAND USE HISTORY

Examination of historical records and documents at the State Department of Land and Natural Resources and the Survey Division of the Department of Accounting and General Services in Honolulu revealed only one Land Commission Award (L.C.A. 11216:12) within the subject project area.

Little mention is made of Naiwa ahupua'a during the historic period. L.C.A. 11216, apana 12, was awarded to Kekauonohi on June 19, 1852, for \$15.00, but no indication of land use was mentioned. Historic documentation indicates only isolated houses and sweet potato cultivation in the inland areas, which was suitable for dryland agriculture. In the early 1900's, the project area was leased to Molokai Ranch, Ltd., followed by a lease to the Del Monte Corporation.

Currently, the project area is used for hunting deer and wild fowl and quarrying activities. A filled-in quarry is located along the southwest area of the project area (Fig. 2). This quarry was abandoned and filled-in in the 1970's. An existing quarry is located outside of the northern boundary of the project area (Fig. 3).

SETTLEMENT PATTERN

The minimal existing data obtained through historical and archaeological research regarding traditional Hawaiian land use suggests that the settlement pattern of Naiwa ahupua'a consisted primarily of permanent occupation along the coastal area. This area would have been most favorable for supporting early settlements, evident from the numerous fishponds, heiau, ko'a, and habitation features. According to Kirch (1971), early settlements occurred on coastal leeward areas in order to exploit the marine resources. Later expansion into the inland areas occurred when dryland agriculture, such as sweet potato, intensified. The absence of any habitation complexes or intensive agricultural modifications in the inland portions of leeward Molokai indicated low intensity use of these areas and suggests a greater importance for marine resource exploitation. This type of settlement pattern; low intensity occupation along the coastal areas, primarily near fishponds, and low intensity agricultural activities in the inland portions, evident from isolated



Fig. 2. Filled-in Quarry Located in Southwest Area of Project Area. View to East.



Fig. 3. Quarry Located North and Adjacent to the North End of Project Area. View to Southeast.

features and minimal historical content; appears to be consistent for the Naiwa ahupua'a. Results of recent studies in the region, including Cleghorn and Pantaleo (1989 in prep.), Griffin (1988), Hommon and Ahlo (1983), Summers (1970), Tomonari-Tuggle (1983, 1990), and Weisler (1989a); support this type of settlement pattern.

SITE EXPECTABILITY

Kirch (1971), Riley (1975), Kirch and Kelly (1975), and Weisler and Kirch (1982), suggest that earliest occupation on Molokai occurred in windward areas where available water resources enabled cultivation of wetland taro. Early settlements also occurred on coastal leeward areas in order to exploit marine resources available from fishponds. Later settlement occurred in the inland areas when dryland agricultural techniques were innovated and population increased.

Athens (1985) challenged these previous theories by indicating that a more complex settlement pattern occurred in the inland portions of Molokai. Athens stated that the less favorable leeward coastal areas were utilized by early Hawaiians for exploitation of marine resources. Based on radiocarbon dates obtained through excavations, Athens suggested that occupation of the Kalama'ula area began at least 200-300 years prior to the dominant Kawela pattern, and may have been visited for more than 500 years prior to permanent occupation.

Based on previous archaeological and historical information, sites expected in the project area include features related to agricultural, ranching, and military activities. These features may include rock mounds, terraces, walls, alignments, and cairns. Due to extensive historic and recent ranching, military, and quarrying activities, the probability of extant prehistoric sites is low.

METHODS

The survey involved walking systematic transects through the project area. Since ground visibility was generally clear of vegetation, transects were 5-10 meters apart. Due to extensive disturbances in the project area, exposed cut banks and the gulch east and adjacent to the project area were inspected to locate potential subsurface deposits or features. Standard archaeological procedures were followed. Black and white photographs were taken of the project area that show land alterations and vegetation.

RESULTS OF SURVEY

No archaeological surface remains or other evidence of any significant cultural activities were encountered in the project area. During the survey, it was observed that the north and west areas of the project area were extensively disturbed by quarrying related activities. A low ridge located in the southwest area of the project area was quarried and later filled-in. Due to a brush fire in the Kaunakakai area approximately two years ago, secondary vegetation including pili grass (*Heteropogon contortus*) and Kiawe (*Prosopis pallida*) was scant (Figs. 4 and 5). This enabled easy access throughout the project area. Based upon the absence of surface cultural remains and extensive disturbance of the project area from quarrying and military activities, subsurface testing was deemed unnecessary.



Fig. 4. Overview of Eastern Portion of Project Area. View to Southeast.



Fig. 5. Overview of Southeastern Portion of Project Area. View to Southeast.

DISCUSSION

The majority of the project area has undergone extensive disturbances through quarrying and military activities. Although the absence of prehistoric remains may be attributed to various land disturbances, other archaeological surveys in the area resulted in similar paucity of remains. This suggests that the outer fringes of the coastal zone in leeward Molokai were not favored for sedentary use prehistorically.

Results from previous archaeological studies and historical documentation for inland portions of Central Molokai indicate that early occupation occurred along coastal areas in order to exploit marine resources, and later expansion into inland areas occurred when dryland agricultural needs arose.

RECOMMENDATIONS

Due to the effects of compounded historical events including ranching, military, and quarrying activities, no further archaeological procedures are recommended prior to construction activities. Also, archaeological monitoring during construction is not recommended, due to the low probability of subsurface remains. If any unanticipated remains are exposed during land alteration activities, all work in the immediate area should be halted and Mrs. Annie Griffin, O'ahu staff archaeologist in charge of Maui County for the Historic Preservation Division, State Department of Land and Natural Resources, should be notified at 587-0014 (O'ahu).

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